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A REMEDY FOR FAULTY WIRING.

A rather common criticism of the electrical contractor is that there are large numbers of men in the contracting business who cannot be depended upon to install work that is free from the fire hazard. But one who is in sympathy with the contractor would be inclined to deny that the number of men who install hazardous work is relatively large when the total number of persons engaged in electrical construction is taken into account. Moreover, the disposition of inspectors and others to explain poor work on the assumption of ignorance or viciousness on the part of the contractor or his representative is by no means always just or well founded. While there are things which might justify the sacrifice of life, of course, the statement is near to the truth that for his life a man will surrender everything else. And the desire for continued existence on the part of the electrical contractor is no less keen or reasonable than is this desire on the part of any other mortal. When he has had to take contracts at starvation prices in order to get them at all it is little wonder if, to save himself, he has sometimes skimped the job where he conveniently could. Nobody would contend that there are not wiremen who do not know how to install good work, and the field is not free from electricians and contractors whose conceptions of honesty are somewhat awry; but the insistence on low prices for wiring has been the most effective of all the causes of shoddy construction.

The remedy for faulty wiring suggested in the foregoing is apparent; it is perhaps the only one that can ever be depended upon to become generally very effective. The education of the contractor in the matter of prices, and, through him and the electrical inspector, the education of the public as to the value of good electrical construction, is the thing to be promoted and encouraged. It is most pleasing to note that the problem of better and safer electrical construction is now being approached from just this angle. Supplemented by the growing practice of requiring electricians to be licensed, the present activity of the associations of electrical contractors in teaching their members to compute costs properly and to insist upon reasonable prices is bound to mean much for improvement in electric wiring practice in this country. This is the source from which betterment is to be most expected.

RATINGS FOR ELECTRICAL MACHINERY.

While the International Electrotechnical Commission at its meeting held in Berlin last month was unable to reach final agreement in regard to the temperature rise which should be taken to determine the rating of electrical machinery, some progress was made by fixing the maximum observed temperatures which should be permitted with different classes of insulation. It was realized that the difference between the highest observed temperature and the hot-spot temperature would be greater in high-potential apparatus than in the machines designed for low voltage, and consequently a higher observed temperature is permissible for the latter without exceeding an ultimate temperature which is regarded as the safe limit. The Commission formulated a list of observed temperatures for different kinds of insulating materials which shall constitute the limit, and these values will be found upon another page of this issue.

Since the rating of a machine or other apparatus must be based upon the permissible temperature rise under some definite conditions of operation, it was necessary to fix a standard for room temperature, and this proved the stumbling block in the deliberations of the Commission, some of the delegates preferring 35 degrees while others insisted upon 40 degrees centigrade. Since the latter temperature may sometimes be reached in engine rooms in hot countries, it, of course, represents a safer standard than the other for indiscriminate use, but does not so nearly represent the average working condition in the temperate zone. Before a temperature rise can be specified it is necessary to agree upon a standard room temperature. In doing so it is well to bear in mind the distinction which must be made between the rating of a machine and its load capacity under particular conditions. The rating represents its permissible load only under some standard conditions fixed by agreement; whereas, the capacity is a variable quantity determined by the conditions of operation in each particular case.

The new Standards Committee of the American Institute of Electrical Engineers held its first meeting on October 10 and appointed a subcommittee which will take up the intricate subject of ratings and try to agree upon standards which will be acceptable for adoption in the Standardization Rules of the Institute. Since the present Standardization Rules have become almost obsolete, it is imperative that new rules be formulated as soon as possible if the Standardization Rules of the Institute are to be the guide for engineers in this country. In the interest of international uniformity it will be well if the Committee of the American Institute can adopt rules which are in harmony with those of the International Electrotechnical Commission, but inasmuch as the latter has left one of the important points open, it will be necessary for the American Committee to come to an independent decision upon this point, since it is not feasible to wait for an international ruling in 1915.

It is confidently expected that the Standards Committee of the American Institute will be able to make a definite report for adoption by the Institute before the close of the present Institute year.

ELECTRICAL SYMBOLS.

Another problem before the International Electrotechnical Commission is an agreement upon definite symbols to be used in representing electric and magnetic quantities. In this connection some very apt remarks have been made in the editorial columns of *The Electrician* (London) of October 10. It is there pointed out that if a schedule of symbols is to have its greatest usefulness and universality it must conform to the reasonable facilities of the printing office.

The modern printer possesses an ample variety of type faces to meet every requirement, but it is well to avoid special symbols not found in any alphabet, and also to avoid as far as possible subscripts to the main characters. Where different styles of the same letter are used it is also desirable to choose such as may be easily indicated in manuscript.

PROMOTING THE USE OF MATERIALS NOT APPROVED.

Electric service has passed the period in its development when it could be classed among the luxuries; it has become one of the necessities of modern life. Anything, therefore, that increases the cost of this service unnecessarily ought always to be discouraged. Excessive fees for the inspection of electric wiring and charges for electricians' licenses that are too high are among such things.

Most electrical contractors know that deliberate extravagance in electric wiring is a rare sort of an occurrence. Since he is generally ignorant of the advantages of good wiring as compared with work of an inferior kind, the average consumer is quite liable to insist upon cheap work, and it has to be admitted that much too often the contractor's anxiety to get the job and the central-station man's desire to increase the load on his switchboard cause these two to omit the proper effort to convince the prospective customer of the error of his position.

One of the most unfortunate expressions of the inclination to humor the desire for cheap wiring is found in the too prevalent disposition to use inferior fittings and materials—fittings and materials that are not on the approved list. Any man who has attended a meeting of the committee that revises the National Electrical Code knows how very carefully the adoption of any rule that would unnecessarily boost the cost of wiring is guarded against. Code requirements are the requirements of safety, and the man who encourages the use of materials that do not come up to Code standards is certainly very short-sighted, or

else he is deliberately choosing a practise that could hardly be given a polite name.

Perhaps it is in order to explain that the above remarks were suggested by the complaint of a supply house whose field covers a large part of the Southwest. This house states that it has lost a considerable portion of its copper-wire business because it has stopped handling old-Code wire. We hope the real cause of this development is not the one apprehended by the complainant, but if he has truly diagnosed the case it constitutes a sad reflection upon both contractors and inspectors in that territory.

AN ELECTRIC-SIGN PROBLEM.

A situation has arisen in the electric-sign business which seems to be of sufficient importance to justify the deepest consideration of all concerned in the development of electrical advertising. It appears that electric-sign manufacturers are burdened unnecessarily with requests for sketches from central-station employees who, according to the manufacturers, feel it their duty to ask every maker of electric signs in the country to submit sketches, designs, etc., on every prospect or imaginary prospect they have in their field, with no consideration of the inconvenience and cost to the manufacturer in the matter, knowing full well that only one order is possible and that one only probable.

In the words of one manufacturer, as published in a recent issue of *Signs of the Times*, "A great many new-business department managers of lighting companies seem to think that the way to keep busy is to determine in their own minds that 'Jones' ought to have an electric sign; and then go back to the office and write a circular letter which is sent to every sign manufacturer in the country giving the various details and asking for sketches, photographs, etc., and when these sketches all arrive it is possible that Jones will turn down the entire proposition on the first interview. The new-business man is aware of the fact that it does not cost him or his company a single dollar to try to wake up Jones, and in the meantime the manufacturer has contributed materially to the apparent activity."

While this may be stating the situation rather harshly, the sign manufacturer certainly has a well founded grievance. There can be no doubt that the installation of an electric sign is of prime importance and benefit to the central-station company, and if the stimulative efforts mentioned are found to be desirable the expenses should justly be borne by the central station itself. It should be remembered that this expense, if forced on the manufacturer, naturally must be added to the price of future orders and is a direct charge on the sign-manufacturing business. In some of the larger central-station companies where electric-sign departments are maintained, preliminary sketches to be used primarily for stimulating business can be worked up by a central-station employee without the aid of the manufacturers. It seems, also, that electric-sign manufacturers could supply central stations with an assortment of designs of signs that have already been installed, covering the usual classes of sign prospects. These designs of course would only be used in preliminary soliciting to create an interest in electrical advertising and to gain if possible some idea of the requirements to be fulfilled.

When a *bona fide* prospect has been developed the sign manufacturers are certainly willing to furnish sketches and all necessary data, but here again a practice has developed that imposes a burden on the manufacturer and consequently militates against the fullest development of the industry. Sign manufacturers are universal in complaining against the practice of central stations in calling for sketches from every sign manufacturer when only one order can be given. It frequently happens, also, that the lighting company purloins from one manufacturer a design that is satisfactory and is accepted by the prospect and sends this design or a copy of it to every other manufacturer to see if the construction cannot be cheapened. Certainly this is unfair and central-station companies should co-operate at least in so far as to give the sign manufacturer an opportunity to suggest something that is satisfactory to the prospect without submitting sketches of one maker to competitors.

Perhaps, if central-station salesmen would make an effort to secure from the prospect complete information as to the sign to be purchased, manufacturers would be in a better position to submit sketches that would meet with approval in every respect and sketches from competitors would not be needed. One of the most important details in the designing of an electric sign is the approximate investment intended and in every case this information should be supplied to the designer.

In fact, the entire difficulty seems to be due to a lack of co-operation between sign manufacturers and central stations. The central-station employee in his desire to stimulate new business has disregarded the position of the manufacturer and the extraordinary expense he is put to in furnishing promiscuous designs. Electric signs are good revenue producers, and if they are to be developed to the highest degree it is essential that all unnecessary duplication of effort be eliminated.

Happily this condition of affairs, while widespread, is not universal and there are many central stations that appreciate the manufacturer's position and do not impose the burden indicated above. Of course, to a certain degree the sign manufacturer, like the manufacturer of many other current-consuming devices, must, in view of the competition involved, do a good deal of preliminary missionary work in securing an order. The point that we insist upon is that unnecessary preliminary work be reduced to the minimum in order that the tax for services and material not used may be eliminated.

W. N. Matthews Heads Jovian Order.

On October 14, 15 and 16, the eleventh annual Jovian Congress of the Jovian Order was held at the Hotel Astor, New York City. The meetings of the order were presided over by Frank E. Watts, Reigning Jupiter.

The report of Mercury, Ell C. Benett, showed that during the eleventh administration there had been added 3,442 new members. The enrollment is now in the neighborhood of 12,000. There is a balance of approximately $8,000 on hand.

J. Robert Crouse, in presenting the report of the Past Jupiters' Association, announced that the Past Jupiters' Fund now amounts to $4,000.

Addresses were made by Henry L. Doherty, president of the Society for Electrical Development; Charles L. Eidlitz, of New York; Dr. Lee Galloway, of the New York University School of Commerce, and James H. Collins.

At the rejuvenation held on the evening of Wednesday, October 15, 183 candidates were initiated. The initiation was followed by a smoker and vaudeville entertainment provided by the New York Edison Company, at the Grand Central Palace. The annual banquet was held at the Hotel Astor on Thursday evening.

The competition on Wednesday afternoon of the various degree teams resulted in the honors being awarded to the New York team. Thomas H. Bibber was awarded individual honors for his impersonation of Pluto.

The following officers were elected for the ensuing year: Jupiter, W. N. Matthews, St. Louis; Neptune, M. F. Knapp, Pittsburgh; Pluto, T. H. Bibber, New York; Vulcan, A. H. Halloran, San Francisco; Avrenim, Louis V. Noguedra, Dallas, Tex.; Hercules, George C. Rough, Toronto, Canada; Mars, E. A. Wilcox, Boise, Idaho; Apollo, George C. Richards, Chicago; Mercury, Ell C. Bennett, St. Louis; Triton, M. H. Jones, Baltimore.

Pioneer-Member Week of Development Society.

It has been decided to make an extraordinarily vigorous campaign for membership in the Society for Electrical Development during the week beginning on Monday, October 27, and ending on Saturday, November 1.

The officers and directors of the Society, its more than 600 members, 45 Jovian Leagues and 12,000 members of the Jovian Order will concentrate their efforts to enlarge the Society's membership to the best of their ability during the six days mentioned.

The Society is growing rapidly, but is still some thousands of dollars short of the $200,000 required before its active work can begin.

It is believed that the personal efforts of all those actively interested in the commercial development of the electrical field concentrated in this short period of time will go far toward bringing about the desired results.

Government Ownership of Telephones.

Theodore N. Vail, president of the American Telephone & Telegraph Company, says the *Wall Street Journal*, October 15, in reply to an inquiry from a stockholder regarding government ownership of telephones, made this statement:

"It is impossible to discuss intelligently the recently promulgated scheme of Government ownership or operation of wire systems which seems to be of disputed parentage. The bill which Mr. Lewis proposes to introduce is a recurrence of the idea of Government ownership which has come up at intervals for the last forty years, and is a personal bill, and not governmental.

"If the Government should go into the telegraph or telephone business, it would be after a very long discussion; and if it was on the basis of purchasing our property, our shareholders would be amply protected, and would receive full value for their stock on any estimate that could be sustained, as our valuations are conservative, and our outstanding securities do not represent the full value of our plant.

"The idea of going into competition, of course, is out of the question. To attempt destructive competition and destroy existing property, of course, is something that would hardly be considered; and, even if attempted, could not succeed, if it could succeed at all, without the expenditure of vastly more capital than would be required to purchase the existing properties.

"Our shareholders should remember, in this connection, that it would be difficult to create or maintain any more severe competition than that which has, and which to a certain extent now exists, and which has cost to create, many hundreds of millions of money.

"I do not think our shareholders need have any apprehension as to the future, and so long as the business is conducted on the present lines of policy."

Annual Steinmetz Meeting in Chicago.

To carry out a pleasant custom of several years, it has been arranged with Charles P. Steinmetz to open the season of joint meetings of the Chicago Section, American Institute of Electrical Engineers, and the Electrical Section, Western Society of Engineers. The opening meeting will be held at 8 p. m. October 29 in Fullerton Hall, Art Institute, Chicago. Dr. Steinmetz will lecture on "Stability and Instability in Electric Circuits."

Chicago Section, Illuminating Engineering Society.

The first meeting of the present season of the Chicago Section of the Illuminating Engineering Society was held on the evening of October 15, with Chairman M. G. Lloyd presiding. J. R. Cravath in a brief talk gave a summary of the Society's recent Pittsburgh convention and exhibited a half-watt 2,000-candlepower nitrogen-filled tungsten lamp.

H. B. Wheeler presented in abstract form his convention paper on "The Lighting of Show Windows," and illustrated it with lantern slides. He exhibited a number of reflectors used for this purpose. This paper was discussed by S. E. Church, A. D. Curtis, J. A. Hoeveler, M. H. Flexner and Mr. Wheeler.

The convention paper on "Factory Lighting" by M. H. Flexner and A. O. Dicker was presented in abstract by Mr. Flexner, who showed a simple type of industrial-lighting fixture rented and sold by the Commonwealth Edison Company. This paper was discussed by George C. Keech, S. E. Church, J. W. Pfeifer, A. D. Curtis and Mr. Flexner.

Lectures at Brooklyn Institute.

The Brooklyn Institute of Arts and Sciences has arranged a series of illustrated lectures on electrical subjects for the season of 1913-14. These lectures will be given in the evenings of the following dates. November 29, "The Correct Use of Electric Light," by Preston S. Miller; December 20, "Lightning and Lightning Protection," by Charles P. Steinmetz; January 5, "Electric Railway Systems," by C. E. Eveleth; February 17, "Is Wireless Power Transmission Feasible?" by Nikola Tesla; February 21, "The Constitution of Matter," by Joseph S. Ames; May 11, "Ozone and Ozonators," by M. W. Franklin.

There will also be lectures on wireless telegraphy and on long-distance telephony and a lecture by T. C. Martin on "Electrical Engineering Industries."

National Registration League to Hold Convention.

S. M. Weatherby, 1309 Race Street, Philadelphia, Pa., secretary of the National Registration League, announces a convention of manufacturers, merchants and importers at the Hotel Astor, New York City, on Friday, November 21, at 2 p. m., to advocate the enactment of an American registration law to protect manufactured products of original design. The convention will also consider the recently enacted Kahn law, and advocate certain amendments to it.

Benjamin H. Glover.

The Underwriters' Laboratories occupy a place in the industrial world that is unique and exceedingly important. In addition to the examination of a great variety of other materials and appliances, there now pass through the Laboratories for test and approval or criticism practically all electrical appliances and materials that happen to be of such a nature that faulty construction or improper use would result in danger of fire. And approval is generally accepted by the electrical interests as synonymous with safety.

That the Laboratories have grown from humble beginnings to their present high place within a comparatively short time has been very largely due to the fact that the management has been able to employ and retain a corps of specialists of unquestioned skill and unfailing fairness. One of these is Benjamin H. Glover, who, as Associate Electrical Engineer, has personal charge of the electrical testing in the Laboratories at Chicago.

Mr. Glover has been in electrical work ever since he was 17 years old, in one way or another. His first work was with a company that was installing a lighting plant in his home town of Grand Haven, Mich. Later his people moved to Chicago, and he entered the employ of the old Thomson-Houston Company in this city. Here he soon saw the need of a technical education, and therefore entered the Armour Institute, from which institution he was graduated in 1897, his being the first class to be graduated from this now well known school of engineering. Upon graduation he was retained as an instructor in the electrical laboratories, for a time.

Mr. Glover left his place at Armour Institute in 1898 to accept one with what is now the Underwriters' Laboratories, which were then known as the Electrical Bureau of the National Board of Fire Underwriters. After five years of service here, he resigned to become shop superintendent and electrical engineer for the Chicago Fuse and Manufacturing Company at Buffalo, N. Y., where he did much development work in fuses and along kindred lines. Mr. Glover left Buffalo at the end of a year or so, and entered the engineering department of the Westinghouse Electric & Manufacturing Company at East Pittsburgh, and here he made a special study of problems of motive power and the like for electric-railway service. When he had been thus engaged for some two years he was called back to Chicago to become superintendent of motive power and way for the Metropolitan North Side Elevated Railway. In 1910, after six or seven years of such varied practical experience in electrical engineering, he was offered a place again with the Underwriters' Laboratories in Chicago, and, having accepted this position, he has been with the Laboratories continuously ever since.

Benjamin H. Glover,
Associate Electrical Engineer of the Underwriters' Laboratories.

Mr. Glover is a patient, painstaking worker, and is a man of a genial temperament and a uniformly accommodating disposition. While he is not the type of man that seeks to push himself into publicity or prominence, he is widely known among electrical men. And those who know him well hold him in highest esteem.

The Firth-Sterling Steel Company, of Pittsburgh, Pa., has contracted for a second Heroult electric furnace of 2.5 tons capacity, to be operated upon a three-phase circuit.

Meeting of American Institute Directors.

The regular monthly meeting of the Board of Directors of the American Institute of Electrical Engineers was held in New York City on October 10. Additional committee appointments were announced. The Committee on Prime Movers was made an independent committee and a Subcommittee on Power Generation was substituted for it in the organization of the Electric Power Committee. H. W. Buck was made chairman of the Committee on Power Generation; W. I. Schlicter, on Technical Lectures, and William McClellan, on Engineering Co-operation.

A budget amounting to $111,125 for the year beginning October 1 was approved upon the recommendation of the Finance Committee.

A section of the Institute was authorized in the Canal Zone, to be known as the Panama Section.

Seventy - three applicants were elected as Associates; four students were enrolled; 14 elected or transferred as Members; 16 Members transferred to the grade of Fellow.

The Executive Committee of the Committee on Organization of the International Electrical Congress to be held at San Francisco in 1915 reported that it had unanimously decided to invite Charles P. Steinmetz to accept the position of honorary president of the Congress; and E. B. Rosa, honary secretary. This action was unanimously approved. The president was authorized to reorganize the Committee with a chairman and vice-chairman, and with the several members serving also as chairmen of the necessary subcommittees of the organization.

Pittsburgh Exposition.

A "Made-In-Pittsburgh" exposition is being held in Motor Square Garden, Pittsburgh, Pa., from October 22 to November 1. This is the third annual event of this kind which has been held under the auspices of the East Liberty Business Men's Committee.

Among the exhibitors are Westinghouse Electric & Manufacturing Company; the Duquesne Light Company; Pittsburgh Railways Company; Doubleday-Hill Electric Company; General Electric Company; Union Electric Company; Eastern Electric Company and Iron City Electric Company.

International Commission's Rating of Electrical Machinery.

As stated in our issue of October 4, the International Electrotechnical Commission at its meeting last month in Berlin, Germany, postponed until 1915 a definite decision regarding what temperature rise shall be allowed in standard specifications for electrical machinery. There was disagreement among the delegates as to whether this rise in temperature should be based upon a room temperature of 35 or 40 degrees centigrade.

At the meeting of the Committee on Rating previously held at Zurich, certain limiting temperatures for modern insulating materials were tentatively agreed upon and these have been adopted with slight modifications. These values, which are given in the table below, apply only to rotating machines up to 4,000 volts and to dry transformers with solidly impregnated coils up to 10,000 volts. Temperature limits for oil-immersed transformers were not decided.

It is presumed that the hottest internal spots will not be more than 10 degrees in excess of the temperatures observed by the methods of measurement recommended by the Commission.

The observed temperature limits which will be permitted in windings for higher pressures than those stated will be less than indicated in the table, so that the maximum temperature at the hottest internal spot will not exceed the same limit. With heavy insulation it is necessary to allow for a greater difference between the observed temperature and the highest internal temperature.

LIMITS OF OBSERVED TEMPERATURE ADOPTED BY THE INTERNATIONAL ELECTROTECHNICAL COMMISSION IN SEPTEMBER, 1913.

	Degrees Centigrade
Non-impregnated cotton	80
Impregnated cotton or paper—general	90
Impregnated cotton or paper—single-layer field coils, stationary or moving	95
Impregnated cotton or paper—stationary coils solidly impregnated throughout	95
Impregnated cotton or paper—rotor and stator windings having the slot portion solidly impregnated or molded	95
Enameled wire (without cotton)	105
Mica, micanite, asbestos—general	115
Mica, micanite, asbestos—single-layer field coils, stationary or moving	120
Mica, micanite, asbestos, stationary coils, solidly impregnated or molded	120
Windings permanently short-circuited—insulated	100
Windings permanently short-circuited—non-insulated	110
Commutators—slip-rings	90
Bearings	80

Railway Battery Cars.

A new storage-battery car and trailer have been tested on the Berlin city railway. A speed of 40 miles per hour is reported to have been obtained over a length of 64 miles. The weight of the train without passengers is 84 tons, and accommodation is provided for 118 persons, with a separate compartment for mail and baggage.

Electric Heating Apparatus.

At the meeting of the Pittsburgh Section, American Institute of Electrical Engineers, on October 14, a paper was presented by H. O. Swoboda on "Design, Construction and Operation of Electric Heating Apparatus."

After discussing the physical phenomena pertaining to generation of heat by electricity, the paper discussed the development of non-oxidizing material for the heating element of electric heating devices and the temperatures which could safely be attained with various materials, such as nickel-chromium-alloy, platinum, carbon treated with silicon vapor, tungsten wire imbedded in proper insulating material, etc. Induction-type heaters were discussed and also the production of temperatures above 700 to 1,200 degrees centigrade, as in the electric furnace. The characteristics of the essential materials used in heating apparatus, having respectively refractory, heat-insulating, electrical insulating and heat-conducting properties, were then considered, and their application and use in commercial types of heating apparatus and electric furnaces was described.

After discussing the inherent efficiency and cost of operating electric heating apparatus, the paper took up a number of interesting points relative to the economics of electric heating, the latter bringing forth a very interesting discussion.

In discussing the comparative cost of electric heat as against gas and coal, T. S. Perkins pointed out that arguments in favor of electric heating must discriminate between applications where the electric method is a convenience and where it is a luxury. For example, to cook a 75-cent steak at a cost of 3 cents makes of the electric broiler a convenience, or to prepare say 7 cups of coffee at a cost of 1 cent makes of the electric percolator a convenience, whereas, to cook 10 cents worth of cereal at a cost of 5 cents for power places the electric method in the light of a luxury. While the cost of operating the electric iron is relatively high compared with the cost of gas for heating the ordinary iron, the fact must be considered that many times more heat is wasted in ironing by gas than is required to heat the irons, while with the electric iron practically all of the energy may be utilized.

Various aspects of electric cooking were discussed by W. L. Waters, as well as economic considerations in connection with industrial applications of heating apparatus and domestic heating by electricity.

M. C. Turpin spoke of the important central-station campaigns and publicity methods for building up the central-station heat load.

In closing the discussion, Mr. Swoboda suggested the necessity of manufacturing and offering for sale apparatus of the hardware type, free of elaborations, suitable for quantity production, simple and substantial in design and requiring minimum cost for operation and maintenance, so that the heating apparatus may be sold by anyone anywhere. This, he says, will be the secret of the ultimate success of electric heating devices, provided the power-supply companies will fix upon some equitable basis for furnishing power at attractive rates to more effectively compete with gas and coal.

Operation of the Wireless Law.

The purchase of wireless apparatus by steamship companies instead of the prevailing practice of renting it, and the direct employment of operators in place of those supplied by the wireless companies, are measures advocated by H. C. Gawler, United States inspector of wireless equipment for New England, in a recent interview.

Mr. Gawler holds that a large part of the apparatus on ocean-going vessels out of Boston is of an antiquated and inefficient type. The yearly rental of the apparatus, together with the services of two operators, whom the steamship company boards, is $1,800 per year. For $1,500 Mr. Gawler says an up-to-date outfit can be purchased in Boston or elsewhere, and by the direct employment of operators the pick of men can be had.

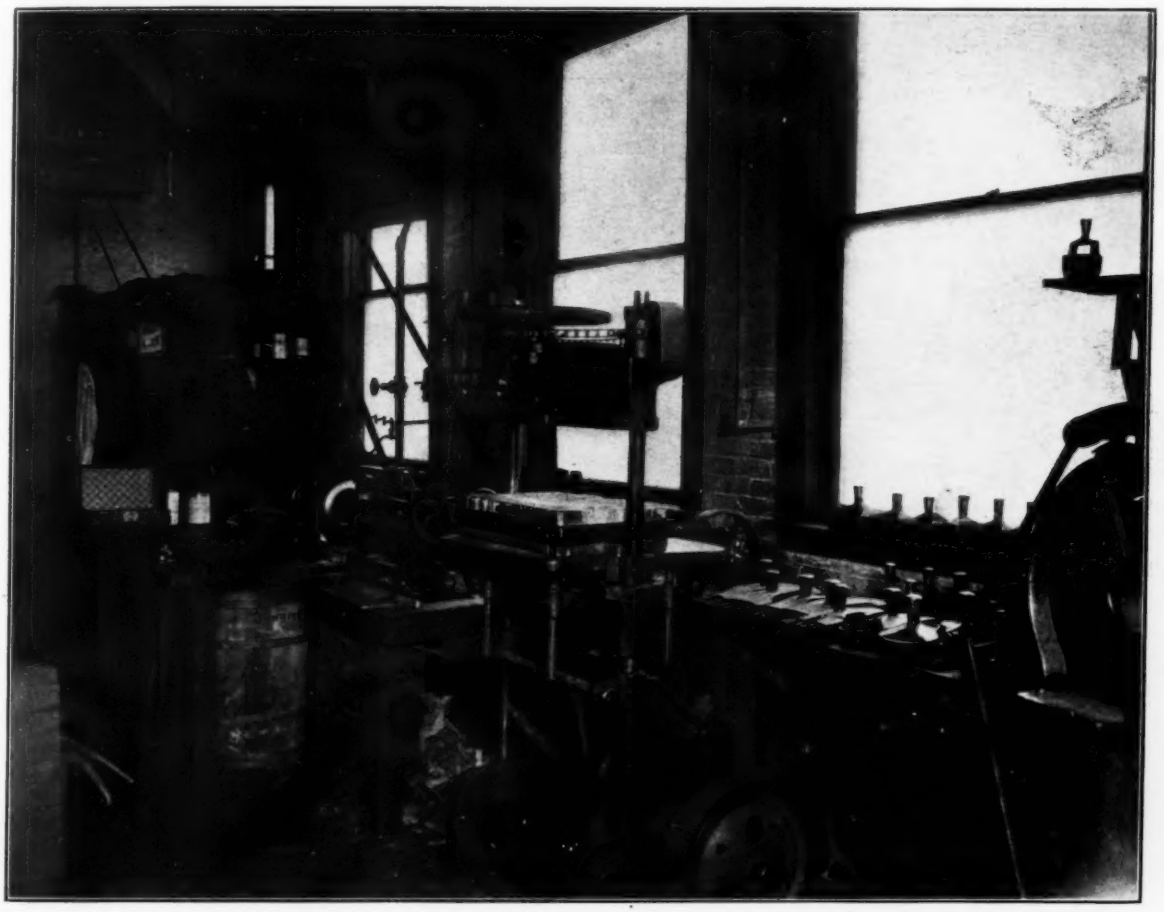
The present law requires every steamer sailing between ports more than 200 miles apart to carry a wireless outfit capable of sending a message 100 miles. Service must be maintained day and night. Mr. Gawler said that the letter of the law is complied with but that many outfits are unable to exceed the 100-mile radius readily. He found the efficiency of one rented equipment hardly more than ten per cent, while that of a new independent outfit was 70 per cent.

Regarding the interference of amateurs in the transmission of messages, the inspector said that the complaints, that were continuous before the law went into effect regulating the subject, a year ago, had entirely ceased. The operators themselves have remedied the matter without need of resort to prosecution. There are today more amateur operators than ever, but in the high, commercial wavelengths there is no interference encountered except in the case of an occasional novice.

Electricity in Harness Manufacturing.

Considerable of the work performed in the manufacture of harness is done by hand although when conditions in the industry today are compared with a few years ago, when all work was done by hand, it seems that the evolution has been of vast proportions. The processes involved in manufacturing harness are simple and with but few exceptions call for no special equipment or present any difficult problem in applying electric motor drive.

Comparatively little power is used in the manufacture of harness, yet the advantages of electric motor drive with central-station power, which apply in so many industries, apply with equal force to this field. Data are given herewith on several typical plants using central-station power.



Group of Motor-Driven Machines in Harness Factory. Skiving Machine on Left, Die Press in Center.

Skiving, cutting, creasing and stitching or sewing are the operations most commonly followed, with occasionally a special machine for embossing or punching. The sewing-machine load, in the majority of plants constitutes the largest item, in so far as power is concerned, although this in itself is small. The application of electric motors to sewing machines has become so universal that little need be said here. Machine manufacturers are now designing equipment in which the motor forms an integral part of the machine itself and these are recommended where individual drive is desired. In general, however, where there are a number of sewing machines on somewhat similar work, group drive is preferable. Tests show that a group drive of 10 sewing machines in the average harness factory takes one horsepower. If individually driven each machine should be equipped with a one-sixth-horsepower motor. While the load-factor on a single sewing machine is low, the load-factor on a group-drive motor is high. This is due both to the approximately regular periods at which each machine is working and to the flywheel effect of the rotating parts.

Slow-speed motors, either alternating-current or direct-current, should be used and should be direct-connected to the shafting driving the machines. These motors should run at approximately 500 revolutions per minute. This arrangement is by far the simplest and most satisfactory. The accompanying recommendations for horsepower of motors necessary to drive the various machines are taken from actual tests:

Machine.	Horsepower Required.
Sewing machines	0.1 to 0.2
Goodyear Rapid Stitcher	0.4
Atlas stitching machine	1.3
Hercules stitching machine	0.8
Automatic stitching machine	0.9
McKay stitcher	0.2
Puritan stitcher	0.2
Skiving machines	0.1 to 0.3

A harness manufacturing plant lo-

cated in Chicago and using central-station service, described herewith, may be considered as typical of the average small plant found in large numbers in all parts of the country. The size of this plant is such that the cost of an isolated steam plant for generating power would be prohibitive but previous to adopting central-station service, a gasoline engine was employed. Perhaps the majority of harness plants are not sufficiently large to even consider a steam or steam-electric generating plant so that the station service, so well recognized in other industries, even where heat is required in the manufacturing processes, apply with equal force to harness factories.

In the plant in question a high grade of harness is produced and some general repair work is also done. The plant operates continuously 10 hours per day the entire year, and while the connected load is comparatively small the load-factor, particularly based on the operating time, is high and the business is considered profitable. On question, aggregating 10 horsepower are all of the squirrel-cage induction type, wound for 220 volts

A one-horsepower motor, running at a speed of 1,200 revolutions per minute is belted to a short line shaft driving two Singer sewing machines and two Campbell sewing machines. All these machines are used on light stitching work only and consequently the motor is larger than is necessary for the present load.

Another one-horsepower motor running at 1,800 revolutions per minute

Group of Motor-Driven Stitchers and Skiving Machines in Harness Factory.

function of the central-station power salesman is to bring to the attention of the manufacturer the many advantages of central-station power over gas oline-engine drive. In view of the records of many central-stations in this connection, the business of harness factories should not be difficult to secure. In the larger cities there will be found, of course, a few large plants, occupying entire buildings, where isolated steam-plant competition will be encountered, especially in climates where the heating season is of long duration. Records show, however, that the economies of central-

the other hand, the manufacturer is highly enthusiastic over motor drive and central-station service which has effected considerable savings in operating costs. In this particular plant the unusual saving reported is due in some measure to the fact that during certain seasons about three-fourths of the work is done by hand, without the use of machines, while ordinarily about one-half of the work is bench work. This feature applies, however, to some extent in every plant and illustrates one of the important advantages of central-station service.

The motors installed in the plant in

is belted direct to a Campbell leather stitcher which is used on heavy work. This motor is suspended from the ceiling which gives the operator sufficient room for handling the various straps to be sewed.

A three-horsepower motor, running at a speed of 1,200 revolutions per minute, is belted to a 10-foot four-hanger line shaft which drives one skiving machine, manufactured by the Stanley Manufacturing Company; one creasing machine; one die press for cutting leather of various shapes; and a buffing wheel, 6 inches in diameter.

(Continued on page 811.)

Harness Manufacturers Data—Sheet No. 1.

The term load-factor is used in these data in such a sense that a load-factor of 100 per cent represents the use for 24 hours every day of power corresponding to the rated capacity of the motors connected. An operating-time load-factor of 100 per cent represents the use of the rated capacity of the motors for the running hours per day specified for each installation.

Harness factory manufacturing a high grade of light harness. Some repair work is also done. About two-thirds of the work is bench work. There are 10 men employed working 10 hours per day.

Total connected horsepower, 10. Total number of motors installed, 4. Average kilowatt-hours per month, 207.

Kilowatt-hour consumption for 12 months.

Month	Kilowatt-hours	Month	Kilowatt-hours	Month	Kilowatt-hours
January	332	May	58	September	155
February	257	June	67	October	342
March	285	July	70	November	345
April	90	August	160	December	325

Load-factor, 4.4 per cent; operating-time load-factor, 9 per cent.

MOTOR INSTALLATION.

The following is a list of the motors installed with their respective drives. The supply source is three-phase, 60 cycles, 220 volts.

No.	Horse-power.	Speed	Application.
1	1	1,200	Belted to a short line shaft driving two Singer sewing machines; and two Campbell leather-stitching machines.
1	1	1,800	Belted direct to a Campbell sewing machine, used only on heavy work.
1	3	1,200	Belted to a 10-foot line shaft with four hangers, driving one skiving machine, manufactured by the Stanley Manufacturing Company; one creasing machine; one die press; and one buffing wheel, 10 inches diameter.
1	5	1,200	Driving mechanism of a 750-pound freight elevator, serving two floors.

Saddle and harness factory located in North Dakota. Plant operates 60 hours per week.

Total connected horsepower, 14. Total number of motors installed, 4. Average kilowatt-hours per month, 581.

Kilowatt-hour consumption for 12 months:

Month	Kilowatt-hours	Month	Kilowatt-hours	Month	Kilowatt-hours
January	682	May	636	September	577
February	761	June	406	October	483
March	773	July	487	November	555
April	436	August	580	December	598

Load-factor, 7.5 per cent; operating-time load-factor, 17 per cent.

MOTOR INSTALLATION.

The following is a list of the motors installed with their respective drives. The supply source is 220 volts.

No.	Horse-power.	Speed R. P. M.	Application.
1	1	1,800	Belted to two stitchers.
1	10	1,600	Belted to short line shaft driving three stuffers; and one die press.
1	1	1,100	Belted to line shaft driving five leather stitchers.
1	2	1,800	Belted to line shaft driving six leather creasers; two rollers; one staple machine; and one press.

Harness and saddle factory operating 54 hours per week.

Total connected horsepower, 25.25. Total number of motors installed, 24. Average kilowatt-hours per month, 628.

Kilowatt-hour consumption for 12 months:

Month	Kilowatt-hours	Month	Kilowatt-hours	Month	Kilowatt-hours
January	598	May	600	September	628
February	672	June	499	October	664
March	703	July	483	November	767
April	654	August	540	December	736

Load-factor, 4.6 per cent; operating-time load-factor, 18 per cent.

MOTOR INSTALLATION.

The following is a list of the motors installed with their respective drives. The supply source is 200 volts, direct current.

No.	Horse-power.	Speed R. P. M.	Application.
2	0.125	1,800	Each belted to a Puritan high-post sewing machine.
1	0.25	1,650	Belted direct to an Alligator sewing machine.
1	0.125	1,800	Belted direct to a Singer sewing machine.
2	0.125	1,200	Each belted direct to a Campbell sewing machine.
3	0.25	1,800	Each belted direct to a Singer machine.
1	0.25	1,800	Belted direct to a Puritan sewing machine.
2	0.5	1,750	Each belted direct to a Fortuna skiving machine.
2	0.5	1,600	Belted direct to a creasing machine.
1	2	1,200	Belted to a Jones No. 52 band saw.
1	2	1,100	Belted direct to an E. E. Spencer corner press.
2	0.25	800	Each belted to a glueing machine.
1	1.5	875	Belted direct to a Hobbs double scoring machine.
2	1	900	Each belted direct to a Hobbs corner cutter.
1	0.5	1,600	Belted to a line shaft, driving three Randall and two Spencer strap cutters.
1	5	1,650	Geared direct to pump.
1	7.5	....	Elevator motor.

Harness Manufacturers Data—Sheet No. 2.

Harness factory located in Milwaukee, manufacturing saddles and harness. Repair work is also done. The rated capacity of the factory is 2,000 sets of harness and 900 riding saddles, but the average output is 1,500 sets of harness and 650 saddles. Plant operates 10 hours per day.

Total connected horsepower, 7.5. One squirrel-cage induction motor is installed. Average kilowatt-hours per month, 175. Average kilowatt-hours per month per horsepower connected, 23.3.

Kilowatt-hour consumption for 12 months:

Month	Kilowatt-hours	Month	Kilowatt-hours	Month	Kilowatt-hours
January	100	May	209	September	211
February	83	June	167	October	183
March	88	July	162	November	269
April	275	August	162	December	154

Load-factor, 4 per cent; operating time load-factor, 9 per cent.

The approximate energy consumption per unit of output (one saddle and one set of harness) is 0.949 kilowatt-hour.

MOTOR INSTALLATION.

The following is a record of the motor installation. The supply source is three-phase, 60 cycles, 220 volts.

No.	Horsepower.	Speed R. P. M.	Application.
1	7.5	1,700	Belted to a line shaft driving one Campbell harness machine; one Champion harness machine; two National harness machines; one Landis harness machine; one Singer harness machine; two Randall creasing machines; one Randall splitting machine; one Randall buffing machine; and one polishing and finishing shaft.

Harness plant operating 10 hours per day. There are 150 men employed, most of whom are engaged in bench work.

Total connected horsepower, 9.75. Total number of motors installed, 8. Average kilowatt-hours per month, 576.

Kilowatt-hour consumption for 12 months:

Month	Kilowatt-hours	Month	Kilowatt-hours	Month	Kilowatt-hours
January	601	May	496	September	621
February	536	June	505	October	725
March	569	July	528	November	617
April	445	August	644	December	625

Load-factor, 11 per cent; operating-time load-factor, 25 per cent.

MOTOR INSTALLATION.

The following is a list of the motors installed with their respective drives. The supply source is three-phase, 60 cycles, 220 volts.

No.	Horsepower.	Speed R. P. M.	Type	Application.
1	1	1,700	Squirrel Cage	Belted to a 2-hanger shaft and a 20-foot shaft (five hangers) under a table driving twelve making machines, (Singer, Wheeler & Wilson); two pinching machines.
1	½	1,700	Squirrel Cage	Belted to a 25-foot shaft (five hangers) under a table operating eight pinning machines.
1	½	1,700	Squirrel Cage	Belted to a 12-foot shaft under table, driving six Singer stitchers; and one W. & W. stitcher.
1	¼	1,100	Squirrel Cage	Belted to a Sawyer leather measuring machine (30-inch driven pulley).
1	3	1,700	Squirrel Cage	Belted to the drum mechanism of Standard 500-pound freight elevator.
1	1	1,700	Squirrel Cage	Belted to a United Shoe Machinery Company clicking machine.
1	½	1,700	Squirrel Cage	Belted to a 10-foot shaft (four hangers) under a table, driving two pinning machines; one double emery wheel, 8-inch by one-inch; one Fortuna splitting machine.
1	3	1,700	Single-phase	Belted to a 30-foot shaft (seven hangers) driving one Krauser embossing machine; one Andrews skiving machine; two Fortuna splitting machines; one Krauser bench embossing machine.

Harness factory operating 60 hours per week.

Total connected horsepower, 11. Total number of motors installed, 3. Average kilowatt-hours per month, 714.

Kilowatt-hour consumption for 12 months:

Month	Kilowatt-hours	Month	Kilowatt-hours	Month	Kilowatt-hours
January	767	May	746	September	700
February	794	June	717	October	650
March	819	July	719	November	725
April	778	August	676	December	725

Load-factor, 12 per cent; operating-time load-factor, 26 per cent.

MOTOR INSTALLATION.

The following is a list of the motors installed with their respective drives. The supply source is three-phase, 30 cycles, 220 volts.

No.	Horsepower.	Speed R. P. M.	Application.
1	3	1,200	Belted to a line shaft driving two skiving machines; three strap cutters; one corner press; and six leather stitching machines.
1	3	1,200	Belted to a line shaft driving one punch press; one Neuman glueing machine; one leather creaser; one straightening roll; and one emery wheel.
1	5	1,800	Belted to a line shaft driving one 12-inch combination rip and cut-off saw; one band saw; and one corner-cutting machine.

In addition to this equipment there is a five-horsepower motor installed driving the mechanism of a 750-pound capacity freight elevator which serves two floors.

While it will be seen from this description that comparatively little power is used in the manufacture of harness, it is nevertheless essential that even the small amount needed be absolutely reliable, due principally to the high labor cost in this industry. There are other equally important requirements of operation that make electric drive with central-station power particularly advantageous in this field. The arguments can be summarized as follows: (1) ease and economy of electric-power transmission; (2) flexibility of location of machines in the building; (3) accessibility of motor-driven machines; (4) wide choice of motors as to size mechanical design, and operating characteristics; (5) perfect control, including readiness of starting, stopping and making speed adjustments; (6) economy of power and timber; (7) ability to operate any portion of a shop at any time with power consumption proportional to work done; (8) reduced hazard of accident.

Industrial work generally requires the application of power at distributed points. No form of prime mover is available which can economically develop power in small quantities at the points of application. The electric motor furnishes the nearest approach to this condition in that electric energy can be economically transmitted and transferred into mechanical energy at the point of application in any quantity desired. When compared with line shafting and belts, the installation of wires for carrying electric current is a very simple and inexpensive operation; in comparing the relative losses in transmission the electrical losses seems almost insignificant.

With electric drive the location of buildings and of the individual machines in a shop is practically unhampered by consideration of power. Buildings can be placed with reference to good labor and transportation facilities, convenience with reference to each other, safety from fires or other disasters, etc., in any case electric energy is easily brought to the required location, the necessary wires being easily installed in space not valuable for other purposes. The machines in a plant can be placed so as to require minimum handling of material and to obtain most economical production; also, better light and ventilation can be given proper consideration. No matter how remote or inaccessible the corner in which the work is to be done, the motor-driven machine can fill the requirements.

The flexibility extends to the re-arrangement of machines to conform to changing manufacturing requirements. A motor-driven machine can be moved from one location to another as a unit without disturbing or interrupting any other machines. The only changes required on account of the power supply are the disconnection of the electric conductors in the old location and their reconnection after the machine is moved. This process is extremely simple compared with that of relocating line shafts and belts. The best arrangement for maximum productive economy can thus be maintained, under changing manufacturing conditions.

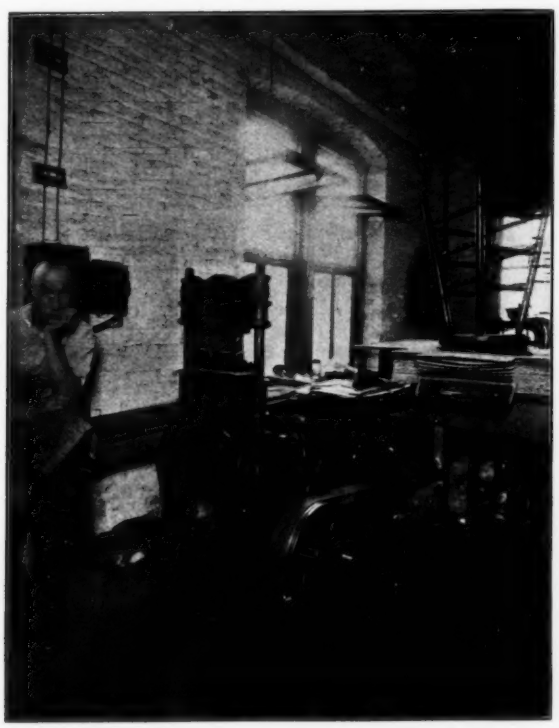
Additions to plants employing motor-driven machines and central-station service require very little consideration on account of power, other than the wiring.

With motor drive the machines become more accessible and the operators are unhampered by the close proximity of countershafts and overhead belts.

Electric motors are standardized in sizes, shapes and with operating characteristics suitable for almost every conceivable application.

By the use of a motor for each machine any machine can be shut down when not in use, thus stopping all wear and loss of power in friction. This is not the case with the line-shaft drive, as the wear and the friction losses in the shafting are only slightly less when all the belts are on their loose pulleys than when all the machines are working.

Three-horsepower Motor Driving Creasing Machine.



Three-horsepower Motor Driving Die Press.

Commercial Practice
Management, Rates, New Business

Data on City Water Pumping with Electric Motors.

Some interesting figures on city water pumping are contained in reports of tests made on three installations by the Keystone Driller Company, of Chicago. At Gas City, Ind., there is installed one No. 34 Downie double-stroke deep-well pump head, in connection with an 8-inch by 7-foot brass working valve, fitted with Downie conical plunger valves. The depth of the working barrel is 150 feet; the suction below the working barrel is 20 feet, making a total depth to bottom of suction of 170 feet. The pump delivers water into a surface reservoir.

During the month of May 3,830,000 gallons of water were pumped with an energy consumption of 1,500 kilowatt-hours. The total cost for pumping this amount was $46, or 1.5 cents per 1,000 gallons. The pump delivers 225 gallons per minute. Energy is supplied by the Marion (Ind.) Light & Heating Company.

At the water works at Waseca, Minn., a Downie double-stroke pump, No. 34. head has been installed for some time with excellent results. The working barrel is 5.75 inches in inside diameter and 250 feet long. The following is the results of a test recently conducted on this unit.

Amount of water pumped in May, 2,757,120 gallons.

Amount of current consumed, 3,590 kilowatt-hours at 1.5 cents per unit.

Total cost for month, $53.85.

Amount of water pumped in June, 2,419,200 gallons.

Amount of current consumed, 3,150 kilowatt-hours at 1.5 cents per unit.

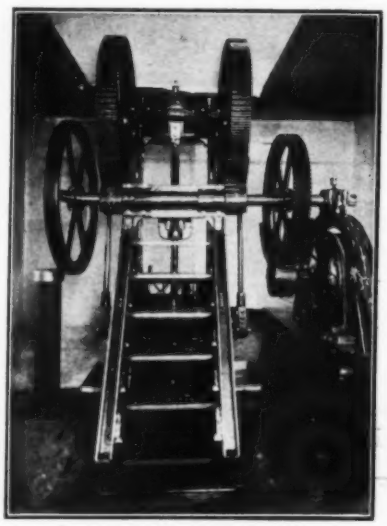
Total cost for month, $47.25.

The working barrel at first was placed at 200 feet at which point it got some air; was then lowered to 250 feet, at which point pump just about gets a sufficient amount to supply it.

This pump takes just 15 horsepower and has an efficiency of at least 75 per cent.

A third test was made on an installation at Platteville, Wis. This city has two wells located adjacent to the water works station. An 8-inch well adjacent to the pumping station is 1,700 feet deep and is equipped with air lift. The other well, about 40 feet further south is a 16-inch hole cased to a depth of 300 feet, beyond which the hole continues 9 inches in diameter to 1,000 feet. The latter has been fitted with a No. 36 Keystone double-stroke pump head, 18-inch strokes, and 11.5-inch working barrel located at a depth of about 195 feet.

The pump is operated by a three-phase, 60-cycle, 220-volt, 35-horsepower induction motor, running at 900 revolutions per minute. Electric power for pumping is purchased by the city from the Interstate Power Company, of Galena, Ill. The pump discharges water from the well to two interconnected circular storage reservoirs close at hand.



Motor-Driven Pump Installed at Waseca, Minn.

A 40-minute test of the installation was made with a view of determining power consumption and pumping capacity. The quantity of water discharged was determined from the computed capacities of the two storage reservoirs. The current consumption was read from the station watt-hour meter supplied by the power company, and serving this motor installation only. During this test, pumping from the surface reservoirs was discontinued. An ammeter and voltmeter were also connected at the main switch in the motor circuit.

During the 40-minute period, 19,388 gallons of water were pumped at a rate of 484.7 gallons per minute. The power consumption during this period was 15,000 watt-hours, or 773 watt-hours per thousand gallons pumped.

Central-Station Power for Ice-Making and Refrigeration.

As an indication of the advances that are being made in the application of central-station power to ice-making and refrigeration, the Commonwealth Edison Company, Chicago, has prepared a booklet illustrating and describing a few of the many notable installations in the city. It is stated that these plants are using electric drive because they can make better ice and deliver it at lower cost than was possible with the old natural method.

Regarding refrigeration it is pointed out that electric refrigeration machinery is coming to be as much the equipment of an up-to-date grocer or butcher as is his refrigerator, artificially cooled showcase or window display. The absolute reliability of the electric motor for this work—the certainty that the temperature will be kept low enough to preserve perishable goods has made a permanent place for it. Electricity is as advantageous for obtaining refrigeration, as for the bigger work of manufacturing ice.

The plants described with the total horsepower connected are as follows:

Company.	Horsepower Connected.
Consumers Company, 6105 Lexington Avenue	595
Consumers Company, 640 W. Sixty-fifth Street	455
Consumers Company, 464 S. Paulina Street	386
Englewood Distilled Water Ice Company	500
Anderson & Goodman Company	300
Mutual Manufactured Ice Company	306
Crystal Manufactured Ice Company	285
Lincoln Ice Company	535
Larsen Ice Company	193

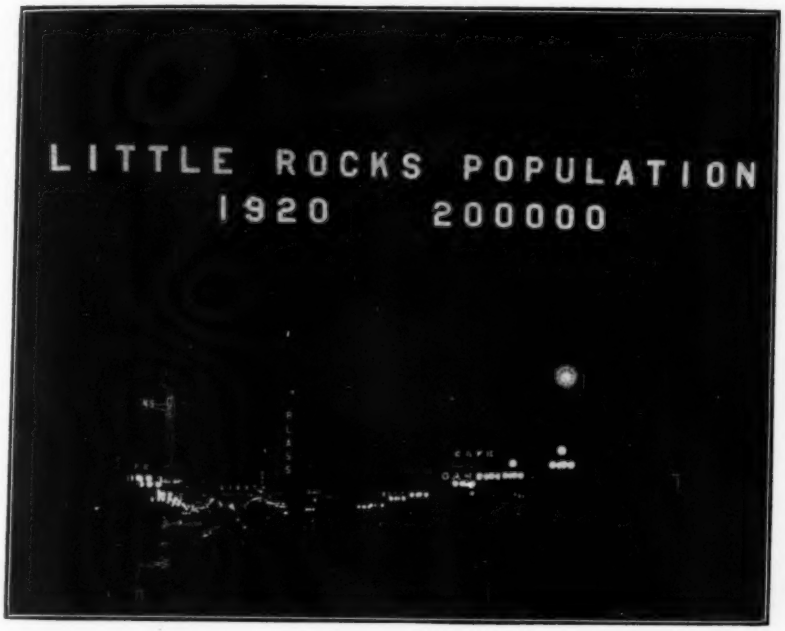
In addition to these plants, all of which are using Commonwealth Edison service exclusively, data are given on 16 installations of electrically operated refrigeration equipments in various establishments.

White Way for Minot, N. D.

The city commissioners of Minot, N. D., have awarded contract for the purchase of 57 five-light white-way posts and material to be used in their installation. The Consumers Power Company, one of the Northern States subsidiaries, operates the electric light utility in Minot and will supply the current for the operation of the "white-way" system. Each pole will carry one 100-watt and four 60-watt tungsten lamps.

Slogan Sign for Little Rock.

The Little Rock Railway & Electric Company has erected a new slogan sign in Little Rock, Ark., which is



Slogan Sign for Little Rock.

shown in the accompanying illustration. We are indebted to A. E. Smith, superintendent of the sales department, for this photograph. This sign has been donated to the city and the merchants will pay for the current consumed in it by subscription.

The sign reads "Little Rock's Population, 1920—200,000." It contains 654 tungsten lamps and is illuminated on both sides. It is suspended on a steel framework on 35-foot poles. Since the erection of this sign various merchants of the city are using the same slogan in their newspaper advertising.

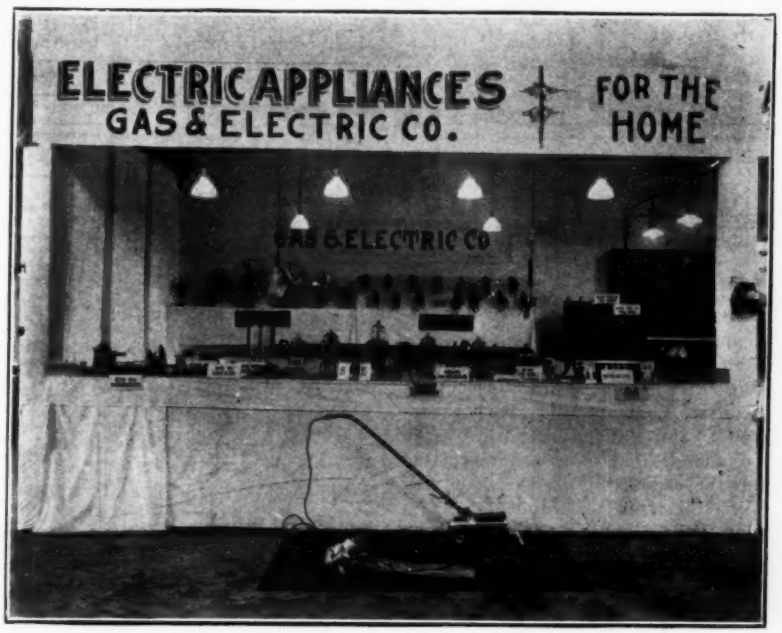
Saving by Electrical Refrigeration.

The economies in the operation of automatic electric refrigerating apparatus are clearly set forth by the experience of a druggist at Springfield, Mass. Last June C. P. Thompson, whose drug store is at Main and State Streets, installed an ice machine which has been used for cooling purposes on the soda fountain and for freezing ice-cream, besides providing refrigeration for storing cream. The use of ice was entirely done away with.

The cost of operating this plant for the month from July 10 to August 10 was $32.65. Had ice been used, as formerly, the cost at the prevailing price of $7.00 per ton would have been about $225. It is estimated that the saving of electricity over ice will easily pay for the machine in one year.

Gas & Electric Company Wins First Prize.

At the Tri-State Fair at La Crosse, Wis., during the week of September 23, the La Crosse Gas & Electric Company won the first prize for the best exhibit in the exposition building. The fair was



Electric Booth of La Crosse Company.

the largest and most successful in the way of attendance ever held in La Crosse and the company feels well repaid for the time and expense necessary to put on a "first-class prize" exhibit. The company used two booths, displaying in one, electric appliances, and, in the other, an all-gas kitchen, the former being shown in the accompanying illustration.

The feature of the exhibit which made it a success was the fact that everything displayed was in use. Bread, cake and pies were baked and given away, as well as boiled eggs, tea and coffee, and other good things to eat and drink.

The apparatus exhibited included heating devices, irons, fans, Sturtevant and Eclipse vacuum cleaners, Parian glassware, water heaters, etc.

The manager of the company is Thurston Owens, and the success of the exhibit was due to the efforts of Frank H. Evans, service agent, Phillip Linker and the cook.

The New York Edison Company Renders Free Emergency Service.

During the heavy rain which occurred some three weeks ago, The New York Edison Company was called upon to help with its electric pumps in clearing out the flooded basements and cellars of many buildings in different parts of the city. The company responded in as many instances as the number of pumps at hand would permit. Among the buildings to which this aid was given was the Colony Club, several theaters and two hotels. All have expressed themselves as exceedingly grateful for this timely assistance.

As no bill for expenses was forthcoming the managements of these buildings have asked in several instances that such a statement be sent them. They were informed, however, that the company was glad to help them in the emergency, and no account would be sent them.

Electrical Construction

INSTALLATION OF RIGID-CONDUIT WORK IN BUILDINGS OF CONCRETE CONSTRUCTION.—III.

By G. N. McCarthy.

Methods of Supporting Motors on Ceilings.

For supporting inverted motors from concrete ceilings, one of the

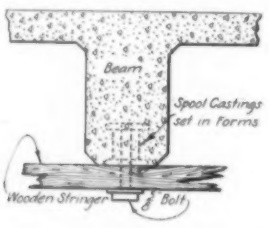


Fig. 27A.—Spool Casting in Place in Beam.

methods of Figs. 27, 28, or 29 can be used. It is the usual practice to mount small motors—say, those of capacities up to possibly 20 horsepower—upside down and support them from stringers fastened to the concrete beams of the

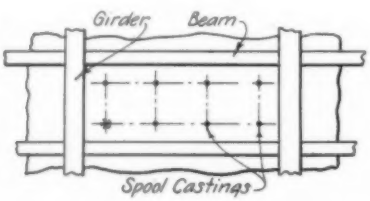


Fig. 27B.—Spool Castings in Position in Floor Slab.

building. By thus supporting the motors from the ceiling, a certain amount of floor space is saved. Inasmuch as the National Electrical Code recommends that motors be insulated from the supporting surface, it is well to bolt the motor to wooden stringers rather than directly to the concrete. The stringers provide sufficient insulation.

The most satisfactory material for these stringers is yellow pine. It should be thoroughly painted so that it will not absorb moisture. Figs. 29 indicate four different methods of fastening wooden stringers to the beams of a reinforced-concrete structure. With the method "A," each stringer is held by two hook bolts at each beam. The hook bolt consists merely of a length of wrought iron, threaded at one end, and having a three-inch hook bent at the other. A hole is drilled into each side of the concrete beam, at an angle with the surface. In these holes the hook ends engage. The stock from which the hook bolts are made should not be smaller than five-eighths inch diameter. In fact, no bolt of a diameter smaller than five-eighths of an inch should be used in a motor support. The reason for this is that a wireman cannot, with an ordinary wrench, twist off a five-eighths bolt. An able-bodied workman can twist off smaller ones.

The method of "A" is used principally where it is necessary to erect stringers in a finished concrete building. Where the erection of stringers is contemplated for a building under construction, holes are provided through the beams, and one of the methods of either "B," "C," or "D," Figs. 29, can be used.

At Fig. 29B is shown the L-bolt method of supporting a stringer. The L-bolt consists merely of a length of

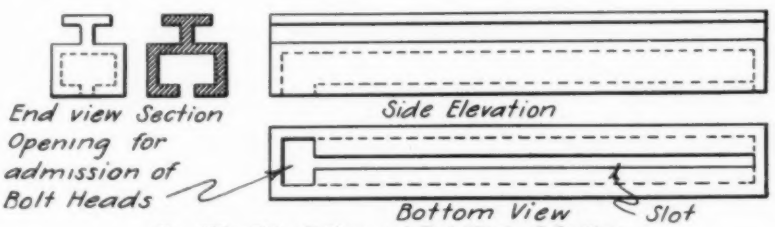


Fig. 28B.—Side, Bottom and End Views of Casting.

iron rod, five-eighths of an inch in diameter, or larger, threaded at each

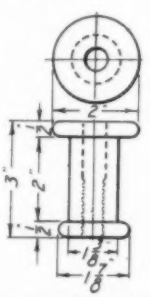


Fig. 27C.—Detail of Spool Casting for Five-eighths-Inch Bolt.

end, and bent in the middle with the ends at right angles. One leg of the ell is pushed through a hole that is formed by a piece of pipe or tin tube that was set in the form prior to the pouring of the concrete. This L-bolt is used only for supporting the lighter loads.

The method of Fig. 29C, which involves the use of a yoke of iron rod, is also used for supporting motors of small capacity. The reason for this

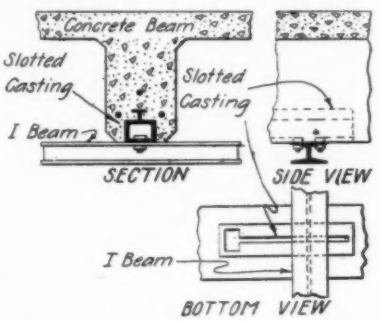


Fig. 28A.—Views of Casting in Position on Ceiling.

is that one bend must be made in the yoke after the iron rod constituting the partially formed yoke has been pushed through the hole in the form. It is not practicable to thus bend an iron rod of a diameter greater than possibly half an inch. Hence, this method, while it provides a good substantial support, should not be used for motors of moderate speed of capacities greater than 12.5 horsepower, say. Sometimes it is possible to catch heavy L-bolts in the beams while the building is under construction, in which case the bolts can be made sufficiently heavy to sustain practically any load that may be imposed on them.

With any of the methods illustrated in Figs. 29, a punched steel washer should be used under the nut to pre-

vent the nut from digging into the stringer.

The eye-bolt method of Fig. 29D,

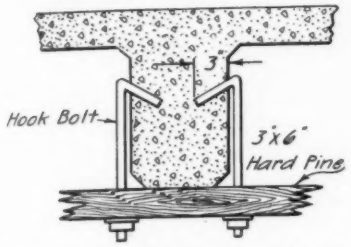


Fig. 29A.—Hook-Bolt Method of Attaching Stringers to Concrete Beams.

can be used to support stringers for sustaining the heaviest motors. It consists of two eye-bolts held to the reinforced concrete beam by a through bolt. The diameter of all three of these bolts should be five-eighths or three-fourths of an inch, in which case the arrangement is amply strong to support a motor of capacity up to possibly 40 or 50 horsepower.

In all of the illustrations of Figs. 29,

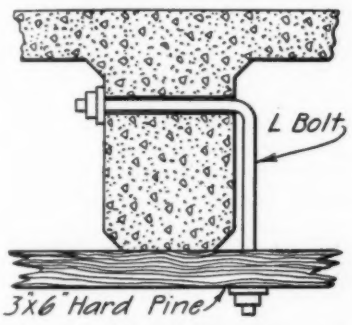


Fig. 29B.—L-Bolt Method of Attaching Stringer.

the support for the stringer is shown at only one beam. It is usually necessary to span at least two beams with the stringer, which then forms a bridge. The motor is bolted to the two stringers at some point between the two points of support at the beams.

In some industrial plants it is the practice to employ only fireproof materials. Where this practice is followed wooden stringers cannot be used

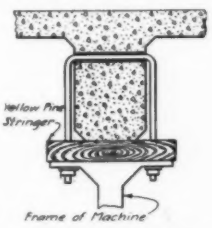


Fig. 29C.—Yoke Method.

to support the motors on the ceilings, and it is necessary to use either steel eye-beams or channels. Figs 28 show a method of supporting a steel I-beam to the members of a reinforced-concrete structure. A slotted casting which is shown in detail in Fig. 28B is cast in the beam, as shown in the "section" at the upper left-hand corner of the illustration. Bolts passing through the I-beam flange can be used to hold the beam in position to the slotted casting. The bolt heads can be inserted into the casting through the enlarged hole at one end. The bolts pass down through the I-beam flange and nuts turn on the threaded

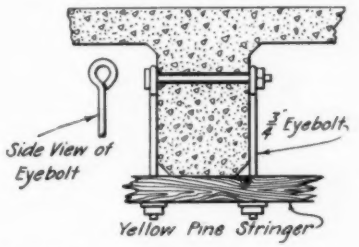


Fig. 29D.—Eye-Bolt Method of Fastening Stringer on Ceiling.

bolt ends against the lower face of the flange. (See Fig. 28A.)

Where slotted castings are used, it is usually the practice to install one or more in every beam at the time the concrete is poured. Sometimes a continuous series of castings extending from one side of the building to the other, is set in the beam face of each beam. More often, however, it is the practice to place the slotted castings only in locations below which it will be necessary to install stringers for line shafting, counter-shafting, or motors. The I-beam stringers for

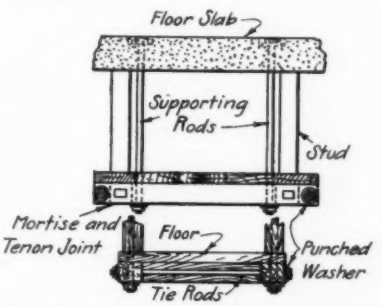


Fig. 30.—Platform for a Motor Suspended from a Concrete Floor Slab.

the support of a motor would extend between two adjacent beams, and would be supported to the lower face of each beam by means of a slotted casting such as that shown. The motor base would be held to the I-beam stringers with bolts in much the same way as the I-beam stringers are held to the slotted casting.

Since the Underwriters require that if a motor is not insulated from the surface which supports it, it must be effectively grounded, it is necessary to carry a ground wire to each motor supported by steel stringers on the members of a concrete building.

Fig. 31A.—Cross-Section of Vertical Concrete Column with Support for Small Motor or for a Motor Starter Clamped to It.

Obviously it is undesirable to insulate a motor in a building where none but fireproof materials are used, because it is almost impossible to introduce any arrangement that will provide insulation that will be substantial without introducing combustible material. The ground wire to such a motor should be of sufficient cross-section that it will have enough mechanical strength to withstand the abuse to which it will be subjected. The ground connection can be made by attaching a wire, in accordance with the methods specified by the Underwriters,

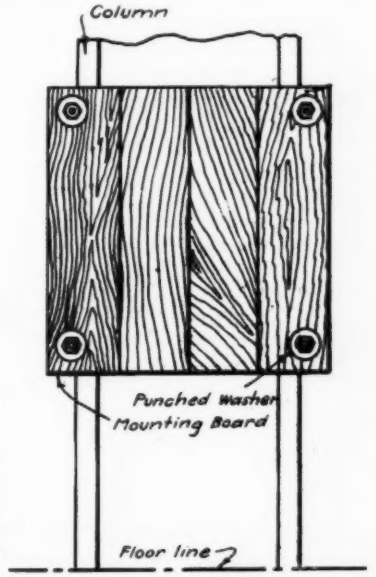


Fig. 31B.—Front View of Motor or Starter Support on Concrete Column.

to the nearest sprinkler or water pipe in the building.

Spool castings are often set in the bays constituting the ceiling of re-

inforced-concrete buildings, as shown in Figs. 27. It is necessary, of course, to set these castings in the forms in the proper locations, at the time the building is being constructed so that the concrete can be poured around them. When the form is removed, the castings remain in the concrete. A spool casting consists, as indicated in Fig. 27C, of an approximately cylindrical piece of cast iron having in one end a hole threaded for a five-eighths-inch bolt. These castings are distributed symmetrically in the floor slab as shown in the illustration, with their lower faces flush with the ceiling surface. Obviously, either wooden or steel stringers on which motors can be supported, can be attached to the ceiling through the medium of spool castings. The spool castings can also be installed in beams by placing them in the forms before the concrete is poured, as shown in the detail in Fig. 27A.

If wood stringers for motors are used between these spool castings and if the bolts that support the motors do not touch the concrete ceiling, grounding of said motors is unnecessary. Where the motor-supporting bolts do touch the concrete ceiling, the motors should be grounded.

A platform for a motor suspended from a concrete ceiling is shown in Fig. 30. Some users of electrical machinery object to inverting the motor and installing it directly against the ceiling, and prefer to use platforms similar to that illustrated. The best arrangement for holding up one of these motor platforms is to drill holes down through the concrete floor slab and countersink the holes where they extend into the floor above. The supporting rods consist merely of wrought-iron rods threaded at each end. The platform is usually constructed of timber, as shown in Fig. 30, although a platform of structural steel would be necessary in installations where combustible materials are not allowed. Before drilling the holes and installing a platform of this type for medium-sized or large motors, it is always well to consult the architect or the designing engineer of the concrete building, and obtain his permission, because in certain cases the slab may be weakened more than is desirable by the placing of such an arrangement.

Small motors, and the starters for all motors, can be mounted on reinforced concrete columns, with the scheme outlined in Figs. 31, without drilling holes in the column. Two U-shaped yokes bent of round iron rod, not smaller than five-eighths of an inch in diameter, hold the mounting board to the column. The mounting board consists merely of two cleats, to which the cross pieces are nailed. The nuts on the yokes are screwed up sufficiently tight against the punched washers, between them and the mounting board, that the whole arrangement is maintained in position by friction. The one difficulty with this arrangement is that the boards are apt to dry out, which relieves the friction and may permit the whole arrangement to drop. However, if a groove is chipped under each yoke at the back of the column and the yokes drawn into these grooves, no difficulty should be experienced. If the column on which the board is attached is subject to vibration, a locknut, in addition to the first nut, should be used at each corner of the board. The locknut, if set up tight, will prevent either nut from unscrewing.

Control of Electrical Installation by the Municipality.[1]

It is a far cry from the days of the middle eighties, when linemen were roasted to death on poles on Broadway, and every fire that could not be definitely assigned to some other cause was charged against "defective insulation," to the present time when no one questions that the control of electrical activities is a function of the commonwealth, and every municipality is striving to formulate and enforce suitable regulations for the installation of electrical appliances on highways and in buildings.

In an orderly sequence there must first be provided laws imposing the duties of control upon some public official; then standards of construction must be promulgated; then inspection service must be instituted; and, finally, some plan must be evolved by which, through licensing or otherwise, electrical contractors or workers can be held to proper accountability for their acts.

To recapitulate, we have:

(1) An ordinance or other enabling act.
(2) A code.
(3) An inspection service.
(4) A license law.

Most municipalities make the mistake of attempting to crowd too much detail into an electrical ordinance. In my opinion the standards of construction have no place therein, because it is often difficult to secure the passage of the ordinance in the first place, and it may subsequently prove to be just as tedious a matter to bring about the enactment of any amendment which may be urgently demanded by the march of electrical progress.

It would be far more satisfactory to state in the ordinance merely that the standards of construction are to be such as may from time to time be promulgated by the responsible authority (commissioner, city electrician, chief electrical inspector, or chief of the fire department, as the case may be).

The ordinance should begin by assigning responsible control of electrical matters to some designated city official. It should then provide that no electrical construction might be performed upon a highway without a permit therefor. Another paragraph should state that no electric wiring nor appliances installed in any building might be placed in service without a permit (or certificate). Another paragraph should provide for the promulgation by the responsible party of sandards of construction otherwise known as "the code;" and if it be deemed desirable to place a check upon this authority, it might also be provided that the proposed code before promulgation must have received the endorsement of the mayor.

Further, provision should be made for an advisory board consisting of at least three persons, one of whom should represent the municipal electrical inspection service, another the local underwriters' inspection service, with the other or other members to be selected as local conditions determine. Generally speaking, it is unsafe to place the average electrical engineer on such a board unless he has had some previous experience in fire prevention practice or ideals. In those localities where a reliable contractors' association exists, it would perhaps be desirable that its representative should hold membership on the board.

It is necessary also that a paragraph should be devoted to suitable penalties for noncompliance with the ordinance or with any rules or regulations made pursuant thereto, and the phraseology of this paragraph must, of course, depend almost entirely upon local conditions.

Finally, electrical construction by other than licensed persons, firms or corporations should be prohibited.

In other words, the ordinance should be merely an enabling act, with suitable restrictions and penalties.

The standards of electrical construction should conform as closely to the National Electrical Code as local laws and conditions will permit. This is in the interest of standardization. It is no longer considered progressive or even smart for any city to adopt a code differing widely from the National Electrical Code. Manufacturers, jobbers and contractors, as well as the inspection departments themselves, suffer unnecessarily not only from these uncalled for differences, but from the mere fact that the form, phraseology and numbering of the National Electrical Code are not retained by the different cities, even though the substance of the requirements is the same in both.

1 A paper read at a meeting of the Kilowatt Club by H. S. Wynkoop, electrical engineer for Department of Water Supply, Gas and Electricity of New York City.

For several years past the city of New York has been printing its code practically in facsimile of the National Electrical Code, indicating throughout the book its specific departures therefrom. One book, therefore—and that the city's edition—serves as the reference medium for our contractors, who through years of experience with the National Electrical Code know just where to find the particular requirement for which they happen to be looking. And when they find it they know exactly what the National Electrical Code calls for, whether the city accepts the requirement, or what substitute the city is enforcing.

Undoubtedly "angels fear to tread" upon the subject of licensing, but others, no matter how you may characterize them, must "step in" as a matter of civic duty.

Those who object to any plan of licensing electrical workers have just two general arguments to advance. They say, in the first place, that this is only another step in the direction of restricting personal liberty, that we are already controlled and licensed nearly to death, and that it is undemocratic, unwise and unfair.

In the second place they point to existing licensing boards—not necessarily electrical—which have fallen under public suspicion, and they express grave fears that the licensing remedy as applied to electricians will, through politics, graft or oppression, be worse than the unchecked and reckless wiring disease.

In the abstract these two objections must be given much weight. Let us consider, however, from the practical side, what the alternative is and how it operates contrary to the public health.

Water, sewer or gas constructions give prompt evidence of their defectiveness, and steps are immediately taken to rectify the errors before serious damage can be done. With electric wiring, however, the defects may remain hidden, or unappreciated, or inactive for days, weeks or months, only to disclose themselves at last by means of some disastrous fire or serious personal injury resulting from electric shock. If, then, licensing of plumbers and steam engineers is deemed essential to the well-being of the community—and this is quite generally recognized to be the fact—the licensing of electrical workers ought to be deemed far more important, partly because the wiring defects are less evident to the senses and partly because there are so very many items of electrical construction that may be classed as defects.

It would appear, then, on the whole that the theoretical objections to licensing must give way before the pressing practical demand for such control over the men who are responsible for electrical construction as will prevent the incompetent and curb the careless or criminally inclined.

Please note that I divide all electrical workers into three classes: the incompetent, such as schoolboys, janitors, bell hangers and their kind; the careless, who handle insulation roughly, nick wires and forget to solder and tape; and the criminally inclined, whose acts clearly demonstrate them to be interested only in having the circuits operative and the certificates issued. Of the criminally inclined I feel that we have comparatively few in New York City, and those few are so bad that they ought to be placed in jail for the remainder of their natural lives!

But if a review of the situation forces upon the thoughtfully minded the necessity for an electricians' license law the subject becomes very cloudy. There are many different interests to be considered, many views to be reconciled, many evils to be guarded against—and the place to conduct these delicate and difficult negotiations is assuredly neither the chamber nor the committee room of the board of aldermen or of the legislature.

Any proposed legislation should be agreed upon in advance by substantially the entire local electrical fraternity, and should be presented for passage in the exact form which the law is expected to assume. With such support it could hardly fail of passage.

The spirit of co-operation and uplift is in the air; why should not the electrical fraternity concern itself with the improvement of its own personnel and the work performed?

It might be well at this point to enumerate the interests which occur to me at this moment as properly demanding representation in such a conference as I have suggested:

The municipal electrical inspection service.

The underwriters' electrical inspection service.

The electrical contractors' associations.

The electrical workers' unions.

The operating companies.

The private plant owners.

Other parties, such as newspapers and factory owners who carry electricians regularly on their payrolls or whose engineers are qualified as electricians.

In my opinion the following points at least should be considered in the construction of a license law: It must define clearly what persons are to be licensed; it must be free from criticism as to class legislation; the fee must be small and the guaranty bond large; it must provide for a majority of technical men on the board; it might preferably apply to the state at large rather than to the municipality, as in this way the greatest uniformity could be secured over the widest territory. It should provide four kinds of penalty; Fine, imprisonment, revocation of license, forfeiture of bond.

The one pre-eminent weakness of electrical control and inspection in this country today seems to center in the question of licensing. In very many communities no electrical license law prevails and in others the laws are inoperative or unsatisfactory for one reason or another. In New York State a number of attempts have been made to enact a license law, but each bill has failed because at the last moment some one interest which had not subscribed, or been asked to subscribe, in advance, to the phraseology of the bill, was able to marshal sufficient opposition at the critical moment.

Electrical Contractors Promote Liverpool Exhibition.

There comes an interesting report of co-operative effort among the electrical interests of Liverpool, England, at a public exhibition or fair recently held there. The electrical display at this exhibition was provided by the central-station and the electrical contractors of Liverpool, and the exhibits were grouped at one stand. It is stated that the local power and lighting company secured the space and built the stand, and that the electrical contractors, aided by some of the electrical manufacturers, provided the apparatus and supplies for the exhibit. The display included an elaborate collection of appliances for use in the home and of small power apparatus, and was cared for by a manager appointed by the electrical contractors. Power was supplied to the stand at a rate of about two cents per kilowatt-hour.

Headquarters of California Contractors Moved.

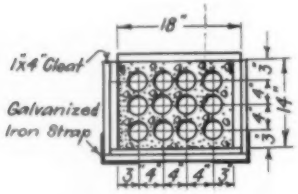
The offices of the California Electrical Contractors' Association have been moved to the Rialto building, in San Francisco, where the secretary, W. S. Handbridge, will hereafter make his headquarters. At the fourth annual convention of the association, which was held in Santa Barbara, August 13 to 16, a movement was started looking toward the establishment of showrooms where displays of standard fittings would be kept for the benefit of architects and others who might be seeking information as to the materials that go into good electrical construction. It is reported that satisfactory progress is being made in the matter of establishing such an exhibit in connection with the association headquarters.

Freight Rates on San Diego Exhibits.

The Panama-California exposition to be held at San Diego, Cal., has secured special concessions from the railroad companies for exhibitors. Full tariff rates will be paid to San Diego and the return will be made carriage free, it is stated.

Electrical Construction for the Panama-Pacific International Exposition.

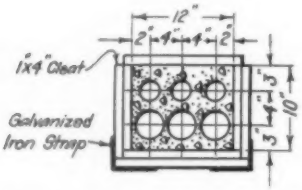
An extensive system of mains for the distribution of electric light and power to all the structures of the Panama-Pacific International Exposition has been devised and nearly completed, under the general direction of G. L. Bayley, member of the American Institute of Electrical Engineers and of the American Society of Mechanical Engineers, who is chief of the exposition's department of mechanical and electrical engineering. He is assisted by L. F. Leury and by Henry Bosch, while the bureau of illumination is in immediate charge of W. D'A. Ryan, who designed and directed the illumination at the Hudson-Fulton memorial celebration in New York.



Sectional View of Conduit Run.

In the main exhibit palaces at San Francisco in 1915, light will be furnished from 60-cycle, three-phase, four-wire mains, having a voltage of approximately 115 between conductors and neutral. The lighting in the other districts, those for concessions and for state and foreign buildings, will be served from 60-cycle, single-phase, three-wire mains, having a voltage of approximately 115 to neutral and 230 between outside conductors.

For power throughout the grounds, 60-cycle, three-phase and single-phase service of 230 volts, will be available. In addition to alternating-current service, there will be mains installed in the palaces of machinery, transportation, manufactures and mines and metallurgy for the distribution of direct current at 125 and 250 volts.



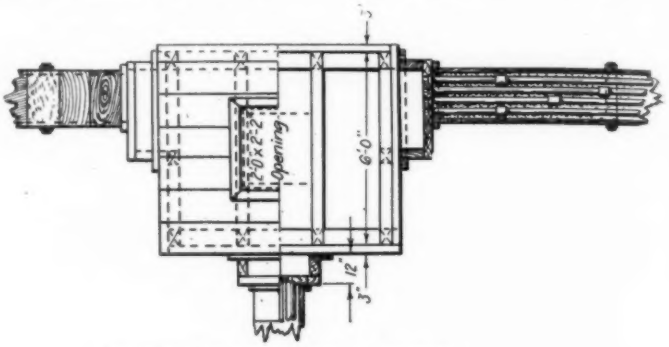
Another Sectional View of Conduit Construction.

Considerable attention was given to the matter of the load requirements and the present idea is based on the assumption that the only buildings which will be open at night will be Festival Hall, the Ferry Building, the Palace of Fine Arts and the Motor Transportation building. All other exposition buildings are supposed to be closed at night, although proper allowance has been made to cover the short days when the lighting load will overlap the day motor load.

The average requirements for patrol and janitor service, and lighting of main exhibit palaces was figured on the basis of one-tenth watt per square foot of building area. To this amount has been added an amount estimated to be sufficient to cover the requirements for motors, booth lighting, incandescent decorative lighting and lighting of detached buildings.

In the state and foreign-government sections the load was based on one watt per square foot of building area, with the building area taken as two-thirds of the total ground area of this district. The average peak load demand of this district, including the live-stock exhibit, was taken at 2,000 kilowatts. The probable demand of the concessions district has been assumed as 2,500 kilowatts. This assumption was based on lighting loads equal to 40 per cent of the capacity of the installed transformers, plus the motor loads, in the concessions district at the Louisiana Purchase Exposition at St. Louis.

	Kilowatts.
Luminous arcs	1,000
Exhibit palaces	2,500
Foreign nations, states and United States government	2,000
Concessions	2,500
Searchlights	500
Average peak	8,500

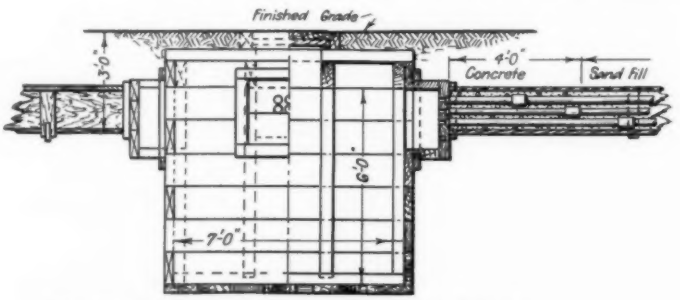


Plan View of Construction at Manhole.

The capacity of the conductors is such as to provide for dark days when ground lighting would be needed before the closing down of the motor load. On this account the exposition peak has been taken as follows:

	Kilowatts.
Luminous arcs	500
Exhibit palaces, buildings, etc.	5,000
Foreign nations, states and United States government	2,500
Concessions	2,500
Direct current motors	1,000
Peak load	11,500

Except an overhead system in rear of the concessions district, and another in the extreme western part of the grounds, for the direct-current power service in the palaces of machinery, manufactures, transportation and mines and metallurgy a total of 1,000 kilowatts has been allowed. Direct-current service is contemplated only when the nature of the apparatus absolutely requires it.



Side Elevation and Longitudinal Section at Manhole.

Under the general assumptions noted above, the average night peak has been taken as follows:

	Kilowatts.
Luminous arcs	1,000
Exhibit palaces	2,500
Foreign nations, states and United States government	2,000
Concessions	2,500
Searchlights	500
Average peak	8,500

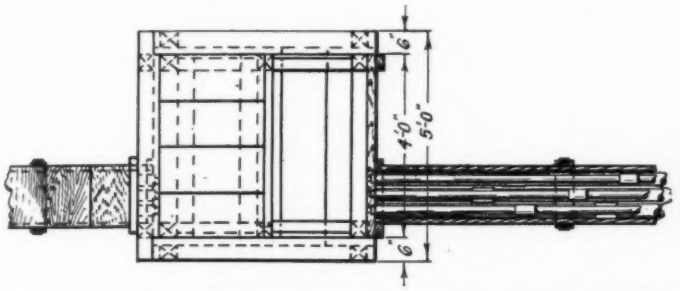
The capacity of the conductors is such as to provide for dark days when ground lighting would be needed before the closing down of the motor load. On this account the exposition peak has been taken as follows:

	Kilowatts.
Luminous arcs	500
Exhibit palaces, buildings, etc.	5,000
Foreign nations, states and United States government	2,500
Concessions	2,500
Direct current motors	1,000
Peak load	11,500

Except an overhead system in rear of the concessions district, and another in the extreme western part of the grounds, in the vicinity of the race track, electric service in all sections of the grounds will be by means of an underground conduit system.

The overhead systems are of the standard pole-line construction. The underground system is based upon the use of wood fiber duct and manholes of wood construction. The box or trough construction will extend between manholes

and will vary in size to suit the number of ducts to be provided. The space between the duct and the wood trough is to be filled with sand, except at the entrance to the manholes, where four lineal feet of concrete will be used. This particular type of underground conduit was adopted because of its mechanical strength and economy. The short life of the exposition required an economical design throughout and attention is called to the fact that the average cost of installation is, in round numbers, ten cents per duct foot with the wood manholes of the shallow type averaging $25 apiece, the deep section type averaging $50 each. No subway-type transformers will be used, as all transformers will be placed in the main exhibit palaces. Vaults for the transformers will be required in a number of the state and foreign nation buildings, and this will be provided for by special arrangements with the designers.

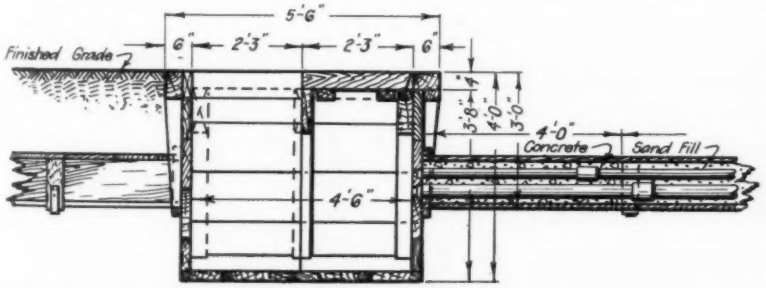


Plan View, with Half Cover Removed, Showing Construction at Manhole in Places Where Water is Encountered.

All electric energy will be distributed throughout the grounds at a primary voltage of 4,000, alternating current, with secondary voltages as enumerated heretofore. All electric energy will be purchased by the exposition company from one of the local power companies, which will construct a central station on the exposition grounds. Present indications are that while the exposition voltage is 4,000, the generating voltage probably will be 11,000 and be stepped down to the exposition primary voltage. In the event of the central station being temporarily disabled, power will be drawn from other sources of the power company.

The luminous arcs referred to in the foregoing estimates of average peak and peak load, are part of the electrical layout for decorative purposes. These arcs will have special diffusing globes to keep the intrinsic brilliancy low. These will be used in the streets and courts of the exhibit section to illuminate the facades of buildings and courts. Some special features not yet fully determined upon, in the way of water and light effects, will occur in some of the courts. From the lamp standards which are used for facade lighting, there will be hung banners which act as screens. These banners will be ornamental and of appropriate design and will form a component part of the scheme. Unique window lighting effects will result, as all exterior windows are to be glazed with a translucent glass, which will diffuse the light from the lamps that are to be suspended between the openings.

The bureau of illumination has developed what is believed to be a new scheme for exterior illumination. The old idea of outlining the buildings and architectural features by means of incandescent lamps, will not be followed at the Panama-Pacific International Exposition. Instead, the entire facade of each building and tower will be flooded with light by means of screened luminous arcs and hidden batteries of searchlights.



Half Side Elevation and Longitudinal Section of Manhole Construction in Location Where Water is Encountered.

As the decorative features in connection with the spectacular illumination, the various parts of the towers and colonnades will be picked out by means of imitation jewels from 21 to 47 millimetres in diameter. These jewels will be mounted in such a manner as to have easy play in the air currents, causing them to glitter and scintillate in the sun's rays by day and in artificial beams by night. They are what is known as Sumatra cut gems, of highest grade, the facets being all tinpolished. Some 125,000 of them will be required in the illuminating scheme.

By means of the searchlights, colored lights covering the whole range of the spectrum will be thrown at night upon the towers and other architectural features on which the jewels are mounted.

While not properly a part of the illuminating scheme, there is planned an unusual effect to take the place of pyrotechnic displays. A battery of searchlights situated on the north front of the exposition grounds will play upon the fogs which sometimes prevail in the vicinity of the site. On foggy nights, this natural advantage will be made a unique and spectacular feature. In clear weather, to take the place of fog, artificial clouds of steam and smoke will be generated and the beams of the searchlights will be flashed upon them. With color as a salient part of the illumination, the exposition will be seen at night from the light of artificial auroras.

Safety at Sea.

Secretary of Commerce Redfield's Committee on Aids and Perils to Navigation has prepared recommendations for the use of the American delegation to the London International Conference on Safety at Sea. These include the following:

All ocean-going steamers, equipped with electricity, shall carry a searchlight so placed as to illumine all points of the horizon, as far as practicable, and of sufficient power to distinguish a ship's 24-foot boat at a distance of one nautical mile on a clear dark night.

The application of radiotelegraphy to the collection of weather reports from oceanic areas gives promise of securing to navigators a greater measure of safety from the perils of the sea than has hitherto been possible. Such a service necessarily would be international in character, the expense of which should be shared jointly by the nations most directly concerned. The committee recommends, in the interests of the future development of radiometeorlogical services, that the existing meteorological service of each administration adopt as part of its program the organization of a radio service for the coastal waters pertaining to that administration.

The United States Naval Observatory has developed a time service by radio which has proved of great value to shipping, and the committee recommends a consideration of the desirability of requesting all governments to establish a like service.

Dollar Wiring Kinks.

Every reader is invited to contribute to this column. It does not matter how few words are used to explain a "Dollar Wiring Kink," provided the idea is made clear; and if a diagram is necessary, a rough pencil drawing will serve. The idea itself must, of course, be new and bright. A dollar will be sent to the contributor upon publication.

Unusual Way of Applying Soldering Paste.

On large knob-and-tube jobs a great deal of time is usually wasted in applying the soldering paste where joints and splices are to be soldered. In order to avoid this loss of time, I devised the simple appliance illustrated in Fig. 1. This appliance may be made as follows:

Take about 2.5 inches of fixture tubing and close one end either by soldering on a cap or by pressing the walls together with a pair of pliers. Next cut a slot near the bottom or closed end of the

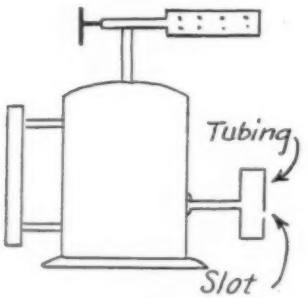


Fig. 1.—Paste Holder on Torch.

piece of tubing, making the slot transverse to the length of the tube, and fasten the tube to the body of a blow torch in the position shown in the figure. An arm made of a strip of brass can be used to attach the tube to the torch.

When a job of soldering is to be undertaken, the electrician has only to fill the tube with soldering paste, and press the slot against the joint after it has been heated. The paste will distribute itself over the joint uniformly. The torch can be carried in one hand and the solder in the other, and in this way much time saved over the procedure employed where the solder must be laid down to apply the flux or paste.

John Shortt.

Fishing Wires to Partition-Wall Outlets.

I find the following procedure a good one where wires are to be fished up from the floor to an outlet in a partition wall, in the wiring of a finished house:

Bore two five-eighths-inch holes in the plaster on the wall at the required height from the floor, and insert the fish chain there. Let the chain down to the opening at the baseboard, and fish the end of it out at this point. Then attach the wire, properly incased in flexible tubing, and pull it to the outlet by drawing the chain back. In this way the circuit can be carried to the outlet without leaving any traces of the work visible on the inside of the room.

George L. Keeney.

Installing Services.

Past issues of "Kink" page have contained notes on the installation of conduit services which recommended the bending of the conduit where it passes through the wall into the basement of the building. I have had better success in using a right-angle fitting here than with bent pipe. It makes a better looking job, makes it possible to get the conduit and service cabinet snug up against the wall, and leaves no unsightly bend down which water

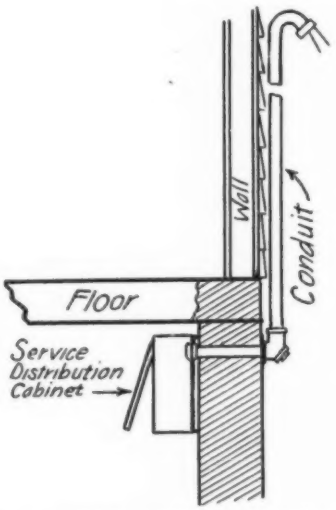


Fig. 2.—Conduit Service from Overhead Line.

may flow into the building. The work costs a trifle more when the standard fitting is employed, to be sure, but the gain in quality of installation more than offsets this.

Russell H. Eddy.

Taking Care of the Ceiling.

On one of our jobs of wiring we had to take a branch circuit off of some wires on the ceiling in an office, and it was very important to avoid getting the ceiling dirty, burning it with the blow torch, or burning the insulation on the wires already in service.

I fastened a piece of asbestos about two feet square between the cleats to protect the ceiling, and wrapped asbestos around the wires for protection to them. When the work had been finished, and the asbestos removed nobody could see any disturbance to the ceiling or wires at all.

F. Husar.

How to Stand on the Desk Without Injuring It.

Sometimes it is found necessary to stand on top of a desk when doing wiring in offices, and I have found that by using corrugated paper to stand on it is impossible to make marks with the heels on the desk, as one is quite liable to do when ordinary paper is used to stand upon.

Two pieces of corrugated paper a foot long and six inches wide can be easily carried in the tool bag, and it is surprising how often there is use for them.

W. E. Griswold.

Tool Convenient in Repairing Meters.

In replacing jewels and pivots in some meters I find that the pivot will stick to the end of the shaft of the meter, due to a slight magnetization of either the pivot or shaft, and it is very hard to make the wrench hold the pivot. I therefore took

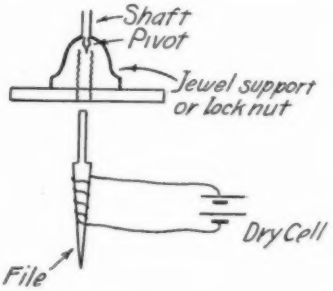


Fig. 3.—Parts of Tool.

a small three-cornered file, shaped the end so it would enter through the jewel support, and I wrapped the file with three turns of No. 22 cotton-covered wire. Then I attached the ends to a dry cell and inserted the file in opening. I can remove pivots with this with ease. I always carry this outfit with me when testing meters.

George W. Martin.

The Life Hazard.

The executive committee of the National Fire Protective Association has created a new committee of prominent members of the association to consider the matter of safety to life. Its definite scope of work is to be decided upon by the new committee itself. It is stated that the committee may possibly decide to go over a number of the standards of the association, among them the National Electrical Code, with a view to suggesting amendments insuring greater freedom from life hazard.

Public Service Commissions

CALIFORNIA.

The Railroad Commission rendered a decision granting authority to the Amador Electric Light & Power Company to issue $12,000 of bonds and 3,000 shares of stock.

The Tulare County Power Company was granted authority to issue $250,000 of notes and $33,000 of stock for the purpose of liquidating the company's indebtedness.

The Commission issued a general order directing all steam and electric railways of the state to provide sanitary individual drinking cups for passengers at a cost not to exceed 1 cent per cup. These cups must be provided on all trains whose schedules between terminals exceed one hour and thirty minutes.

The Pacific Telephone & Telegraph Company was directed to reduce its rate for telephone service within the city of San Jose and neighboring territory. In its decision the Commission eliminates the $5 deposit required for telephone service. The Commission finds further that the company has been paying an abnormal percentage of its gross receipts to the parent company, The American Telephone & Telegraph Company. Reductions of 50 cents per month for business telephones and 25 cents for residence telephones were made.

The Sonoma Valley Water, Light & Power Company has been authorized to issue six-per-cent bonds to the amount of $30,000.

MARYLAND.

Albert G. Towers has been appointed a member of the Public Service Commission in place of Joshua W. Hering, who died on September 23.

MASSACHUSETTS.

The Massachusetts Gas and Electric Light Commissioners have approved the issue by the Fitchburg Gas and Electric Light Company of 3,216 shares of new capital stock, at $85 per share (par value being $50), the proceeds of 1,058 shares to be applied to the payment of notes outstanding March 31, 1913, and of 2,158 shares to the payment of obligations incurred for additions to plant made after that date.

The Commission has approved the issue by the Easthampton Gas Company, a combination gas and electric company, of 1,000 shares of new capital stock at $100 per share, the proceeds to be applied to the payment of notes outstanding June 30, 1913.

NEW HAMPSHIRE.

The Public Service Commission of New Hampshire has authorized the purchase by the Twin State Gas & Electric Company of the properties of the Cascade Light & Power Company, doing business in Berlin, Gorham and Milan, at the price of $240,825.47. The Commission, in authorizing the Twin State Company to do business in the towns referred to, stipulates that no higher rates be charged for electricity than were charged by the original companies, except with its consent.

The Commission has disapproved the petition which sought authority to purchase the properties of the Berlin Electric Company for the price of $172,000, but consents to the transfer at $74,174.53. The Twin State Company is authorized to purchase the securities of the Berwick and Salmon Falls Electric Company for $27,000. It is also authorized to issue bonds to the amount of $1,232,000, par value. A portion of these bonds is to be used to refund previous issues covering several New Hampshire properties. The balance is to provide for the purchase of the plants and securities authorized by the Commission.

OHIO.

The Public Utilities Commission has authorized the Lafayette Light & Power Company to issue capital stock to the amount of $10,000, to be sold for not less than par and the proceeds to be used for expenses of organization, engineering services, purchasing rights of way, etc.

The Defiance Gas & Electric Company has been granted permission to issue $114,000 in first-mortgage bonds to be sold for not less than 80.

OKLAHOMA.

A precedent of importance to all gas and electric companies in Oklahoma, indicating the disposition of the Corporation Commission to do away entirely with minimum rates, is set by the decision of the Commission in the Collinsville gas case, in which it ordered that "no one shall be required to pay for gas that they do not use during the month." It is admitted by members of the Commission that that decision is indicative of the position which it will take in the complaint brought by Homer Law, of Oklahoma City, against the Oklahoma Gas and Electric Company, complaining in regard to the enforcement of minimum rates on gas and electricity, which is to come up for hearing before the Commission soon. In case the Commission should issue an order requiring the suspension of the minimum rate in Oklahoma City, similar complaints would be made from the other larger cities of the state and efforts would probably be made to get the Commission to issue a general order on the subject.

Electric light, gas and water companies offered practically no opposition to the making final of the proposed order of the Commission requiring such companies to file copies of rate sheets and contract forms, when the matter came up for hearing on the October docket of the Commission. The final order will therefore be issued by the Commission and the companies will also be required to file notice thirty days in advance of any proposed change or increase in rates.

WISCONSIN.

In a decision recently handed down Judge Stevens of the Circuit Court has declared unlawful that part of the Railroad Commission's order which denies the petition of the Citizens' Telephone Company of Eau Claire to issue and sell stock for the purpose of enlarging and extending the plant of the Chippewa County Telephone Company, which it has acquired. The Commission denied the petition for the reason that the Chippewa County Telephone Company was not doing a local business and was therefore not in competition with the Wisconsin Telephone Company at the time it was taken over by the Citizens' Telephone Company; that to grant the issue of stock to enable the petitioner to do a competi-

tive local business would be in violation of the statutes which forbid the duplication of telephone equipment unless public convenience and necessity demand it. The court ruled that the statute under which securities are issued must be followed, regardless of whether it authorizes wasteful and useless duplication of plants. This is a question for the Legislature and not the Commission to decide.

In the first decision under the new stock-and-bond law, which authorizes a corporation to bring up the total of its outstanding stock, bonds, notes and other evidences of indebtedness more nearly to an equality with the value of its property, the Commission has authorized the Wells Power Company of Milwaukee to issue $171,000 in securities. This amount represents the difference between the present value of the physical property and business of the corporation, including a value for leases and a reasonable sum for working capital, determined by the Commission to be $378,200, and the sum of $207,000 representing the total of the stock and bonds now outstanding. Of the issue authorized, $136,000 is for common stock and $35,000 for ten-year, six-per-cent notes. A second certificate was granted the above company authorizing the issue of $265,000 in ten-year, six-per-cent notes, to be sold for not less than 75 per cent of par. The certificate stipulates that the proceeds of not to exceed $190,000 of the above notes shall be used to retire $143,000 of demand notes now outstanding, which were incurred in the construction and acquisition of the property now owned by the corporation. The proceeds to be derived from the sale of the balance shall be used to pay for extensions and improvements to the plant.

Civil Service Examinations.

The United States Civil Service Commission announces an examination on November 10 for the following positions in the Bureau of Mines, Department of the Interior: chief metallurgist at a salary ranging from $4,000 to $4,800 a year; metallurgical engineer for work in iron and steel, at a salary ranging from $3,000 to $4,000 a year; metallurgical engineer for work in iron blast-furnace operations, at a salary from $2,500 to $4,000; metallurgist for work in low-grade ores, at a salary from $3,000 to $4,000 a year; metallurgist for work with smelter fumes, at a salary from $2,700 to $3,600 a year; assistant metallurgist, at a salary from $2,000 to $3,000 a year; electrometallurgist, salary $1,800 to $3,000 a year; assistant petroleum chemist, salary $1,800 to $2,160 a year.

Applicants will not be assembled for actual examination, but will be rated on the following subjects: general education and technical training, professional experience and fitness, publications, theses or reports.

On November 5 and 6 the United States Civil Service Commission will also hold an examination at the usual places for securing a list of eligibles for the position of aid in the Bureau of Standards, Washington, D. C., at salaries ranging from $600 to $720 a year. Applicants will be examined in elementary algebra, geometry and trigonometary, general physics, mechanical drawing, and will also be rated on education, etc.

Among the Supply Men

Northwestern Electric Equipment Company to Have New Building.

The Northwestern Electric Equipment Company, St. Paul, Minn., has purchased property and let the contracts for a modern office and warehouse building situated in the center of the wholesale district of St. Paul. The new building is to be erected with three things in mind—first, service to the customers; second, plenty of light and fresh air for employees; third, plans for future growth. It is expected that the building will be completed about January 1, 1914. The plans call for a reinforced concrete building, 150 feet by 50 feet, with six floor and a basement. The front of the building will be faced with a reddish-brown faced brick and the trade mark of the company "N. W. E. E. Co." will be prominently displayed. Additional window space is provided on the second and fifth floors. The entire second floor will be given over to the office force and the fifth floor will be devoted entirely to the manufacturing department and repair shop of the company. The first floor will be devoted to display and demonstrating rooms. Dealers and central stations will be invited to make full use of this floor and to bring their customers to show them exactly what the electric equipment will do under what will approximate as nearly as possible actual working conditions.

The company publishes a very interesting monthly called the "Northwestern Buzzer." This bulletin will tell each month of the progress of the work, and upon completion of the building it is the intention of the company to publish an anniversary booklet making a complete photographic display of each department.

The company has recently been awarded by J. F. Druar, consulting engineer of the Oscar Claussen Engineering Company, of St. Paul, the following material: Electric equipment for the Town Hall, electric light station, fire headquarters and jail, including generator and gas producer outfit complete, pole line, wiring, etc., for Warroad, Minn. Contract for the oil engine, generators and battery equipment for the electric light station at Lake Park, Minn.

William L. Goodwin, vice-president and general sales manager of the Pacific States Electric Company, has returned to San Francisco after a considerable trip throughout the Eastern States and the western branches of the company. Included in his trip, Mr. Goodwin attended the September meeting of the National Electrical Supply Jobbers' Association at Niagara Falls. The company has warehouses and sales rooms in San Francisco, Los Angeles and Oakland, and at Portland, Ore., and Seattle, Wash. Monthly sales meetings are being held at Seattle, Portland, Los Angeles and San Francisco. All salesmen are brought into their respective houses on the last Monday of each month. The company has recently secured increased warehouse and office facilities at the Portland branch by adding another story to its building at Nos. 88 to 92 Seventh Street.

Report from the Turner Electric Supply Company, Birmingham, Ala., formerly the Southern Wesco Supply Company, indicates that crops are good and business is picking up very materially.

Questions and Answers.

All readers of the Electrical Review and Western Electrician are invited to submit questions and answers to this department. Full names will not be printed except where the writer indicates his willingness therefor. Anonymous communications will not be considered. Questions relating to electrical matters of any kind will be inserted. Answers from our readers should be received in this office preferably within ten days of the date of publication of the question, and will be published in a subsequent issue. Payment will be made for all answers published.

Questions.

No. 165.—Synchronous Motor for Line-Voltage Regulation.—A short time ago I heard of the use of synchronous motors on a transmission line to keep the voltage constant at the receiving end. Is this method dependable and is it much used?—N. P. T., Fort Wayne, Ind.

No. 166.—Relation of Tungsten-Lamp Efficiency and Life.—About what is the ratio of life of a tungsten lamp operated at an efficiency of 1.25 watts per candlepower to the life of a similar lamp operated at higher voltage so as to give an efficiency of 1 watt per candlepower?—B. K., Madison, Wis.

No. 169.—Electric Meat Curing and Electric Tanning.—I would like to know where to get some information on the electric meat-curing and electric tanning processes.—A. M. B., Toledo, Ohio.

No. 170.—Changing Fan Motor to Lower Frequency.—Is there any way in which an Emerson fan motor now arranged for 104 volts and 16,000 alternations can be made to run on 104 volts and 7,200 alternations?—J. W. K., Niles, Ohio.

No. 171.—Control of Mercury-Arc Rectifier.—Can a mercury-arc restifier be controlled to give a constant current otherwise than by the use of a constant-current transformer on the supply side?—S. G. P., Erie, Pa.

No. 172.—Renewal of Plug Fuses.—What is the practice of large central-station companies that supply Edison plug fuses for the cutout cabinets of residence customers; do they throw away the blown fuses or attempt to refill them? If carefully refilled so as to be substantially like new, will inspectors pass them?—W. K., Wichita, Kans.

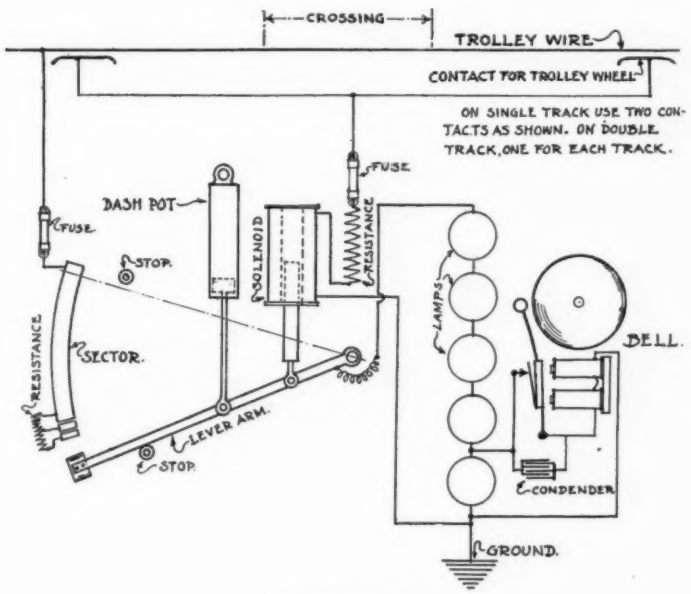
Answers.

No. 162.—Electroplating Lead and Brass.—Is there any good method for electroplating lead or brass on copper and iron? I should like a formula for the solutions used.—R. H. P., Philadelphia, Pa.

Lead depositing is used on a very large scale and the process makes a perfectly satisfactory lead plating. Full description of the process is contained in "Lead Refining by Electrolysis," published by Wiley & Sons, New York.—A. G. B., Asheville, N. C.

No. 163.—Parallel Operation.—I would like to see the following question answered by contributors to the Questions and Answers page. We have a three-phase, four-wire, 60-cycle, 220-volt, 200-kilowatt generator driven at 200 revolutions per minute through rope drive by a simple Corliss engine running at 79 revolutions per minute. There is a two-phase, 60-cycle, 6,600-volt transmission line connected to two 150-kilowatt transformers whose secondaries are Scott connected so as to deliver three-phase, 220-volt current to the switchboard. The engine regulates well enough to operate in parallel with a high-speed unit and the transmission line is "rock" steady. Can the generator be operated satisfactorily in parallel with the transmission line?—W. H. M., Hutchinson, Kans.

Any two sources of alternating electromotive force of the same potential, number of phases and frequency may be connected together to share a given load, provided the wave forms of the two sources are similar or nearly so. If the wave forms differ either in the fundamental or on account of the presence of harmonics in one which do not appear in the other, there will be momentary exchanges of current or surges between the two sources. Should the difference in wave form be considerable, the resultant interchange of energy may be of sufficient magnitude to prevent satisfactory parallel operation, but in most cases this will not be so. In any event the answer can be determined by trial where generators of small size are concerned. With very large units, oscillograms might be taken and compared which would show up any considerable differences in the forms of the waves. Networks of all conceivable kinds are being operated satisfactorily all over the country and in the case in question it is believed that no difficulty will be encountered. It is stated that the three-phase generator, which it is desired to operate in parallel with the three-phase side of the Scott transformer, is of the four-wire type. The neutral should then be connected to the neutral of the Scott transformers, and over-load circuit-breakers should, of course, be installed in at least one set of leads. On the trial run, it would be well to have the breakers set fairly low. The trial may be made absolutely safe by inserting resistances of equal amount in each of the leads of the generator. These resistances need not be large, say of 20 ohms, for a preliminary run. If the operation proves to be satisfactory, the resistance may be reduced or if, with the load cut off the station bus, no current is noticed on ammeters in the machine or transformer leads, the resistances may be removed entirely. The load should first be thrown on gradually, however, with the circuit-breakers still set at a low value, for it sometimes happens that machines operating satisfactorily in parallel at no load or at light loads, surge badly when heavy load is applied, particularly if the load is at all unbalanced. In some cases small resistances have been left in the leads when slight surging occurs. While these resistances are small when compared to the external or load circuit, they are relatively large as regards the circuit between the two machines, or in this case, between the machine and the transformer. These resistances may be only two or three ohms each for 220-volt operation. The amount used to damp out the surges should not, of course, be so large that the I^2R loss offsets the economy secured by parallel operation. It may be interesting to note that a large electric railway sys-



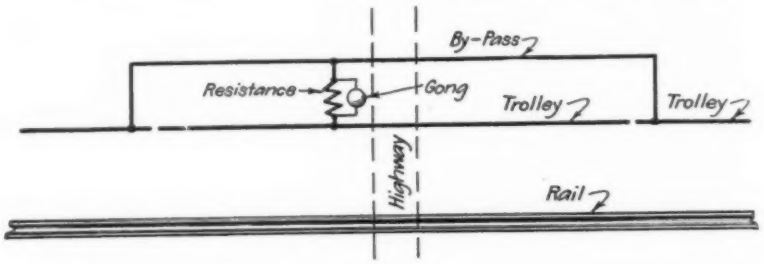
No. 168.—Fig. 1.

tem was able to damp out serious surges between two stations, by inserting a resistance of eight ohms in the neutral wire. The same scheme might be used in the present instance if surging occurs.—H. S. P., Bloomfield, N. J.

No. 168.—Electric-Railway Crossing Signals.—Is it possible to arrange a series of highway-crossing signal gongs along a direct-current interurban railway that shall be operated by the line current when a car approaches the crossing without requiring any local batteries? If so, how is this done?—H. B. W., Erie, Pa.

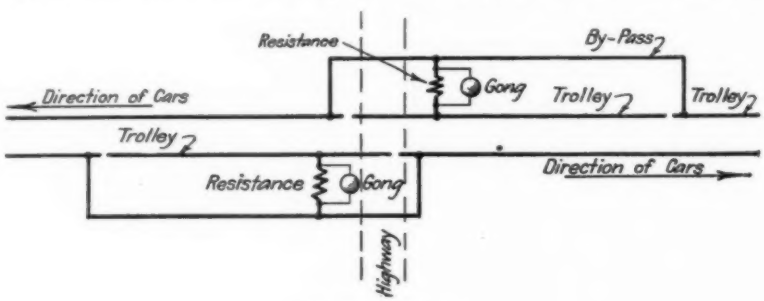
Several years ago I had a bell system working off of the railway circuit and the sketch on page 823 shows the connections. In my case the bells were small and were bridged across a 32-candlepower lamp; if large bells are used, larger lamps (large-size Gem lamps, for instance) will have to be used or else a wound resistance of wire. A condenser connected across the make-and-break of the bell will prevent materially the burning of the contacts. Some means of making connection by the car from the trolley wire to the solenoid must be used. This can be done by placing a contact near the trolley wire which will make contact with the trolley wheel when pasing, or a contact can be placed over the trolley wire so that when the trolley pole is under same the trolley wire will make contact by being raised; I don't think much of this latter method, although I have seen it used, since temperature variations will cause contraction and expansion which throw the contact out of adjustment. There is a system on the market of making contact by the depressing of the rail by the weight of the car; the movement is very slight but is magnified by means of a lever. If the current is very large through the series of lamps there will be an arc drawn out at the end of the sector; this can be remedied by dividing the end of the sector as shown and bridging these gaps with resistances. The dashpot will be the weak part of this device, as dashpots have a habit of sticking. The dashpot will have to be arranged so that the *upward* movement will be *free* and the downward movement retarded. As the lever arm reaches the bottom the dashpot should release quickly so that there will be a quick break between the end of the arm and the sector.—C. T. P., San Francisco, Cal.

One method of arranging a signal gong at an electric railway crossing so that it will be operated by the current taken by a car as it approaches the crossing, is shown in Fig. 2. An insulating joint is cut in the trolley wire on each side of the crossing and as far from it as it is desired to have the signal begin to operate. A by-pass, of at least as large conductivity as the trolley wire, is carried around the insulated section to feed the line beyond, and is connected to the insulated section at the crossing through a resistance. When a car reaches the insulated section, its current will be supplied through the resistance, and if this is properly proportioned to the amount of current taken by the car, the signal may be operated by the drop in potential across the resistance. Ordinary gongs will operate satisfactorily on 8 to 10 volts and the resistance should be such that the drop will be approximately this amount when a car in the section is taking its normal current. For example, if the normal current is 30 amperes, a resistance of 0.3 ohms will give a drop of 9 volts. In any case the resistance may be calculated from the formula $R = V/C$, where R = resistance in ohms, V = voltage required to operate the signal, and C = average amount of current taken by a single car. The resistance should, of course, be of sufficient size to carry the full-load current of one car without undue heating, and the motormen should be instructed to keep current on the car and not coast through the section. It is obvious that on a single-track system with cars operating in both directions, the gong will be rung as the car leaves the crossing as well as during the approach. If the cars operate in one direction only, this feature may be avoided by terminating the insulated section at the crossing. On a double-track system it may be avoided by using two gongs, operated by separate resistances as shown in Fig. 3.—H. S. P., Bloomfield, N. J.



No. 168.—Fig. 2.

A prominent supply company of Chicago, in addition to several others, has a signal that operates without the use of batteries. This is described as comprising a circuit containing the necessary number of contactors to operate the signal by means of the trolley wheel (or contact shoe), an oil-immersed relay and a high-resistance bell with the necessary wires connecting same. It is operated by means of the contactor receiving current from the wheel (or shoe), transmitting it to the relay and to ground, completing the circuit. The relay closes a local circuit through the bell from the trolley wire to the ground. A second contact causes the relay to open the local circuit. The bell, therefore, rings from the time of the first contact to the time of the second. In order that the bell be silent on single-track work after the car has crossed the protected point, the relay is so designed that it closes with the first impulse, opens with the second and is not affected by the next made when the trolley wheel makes the contact used for signaling when a car comes in the opposite direction. The next contact, made at either distant point, will again cause the bell to ring. The relay will operate either bells or lights or both. A single wire is required from either distant point to the crossing. The current required is one ampere. The apparatus is weatherproof. The value of the single-track equipment, less wire, is about $100 for a 10-inch bell equipment.—W. M. P., Seattle, Wash.



No. 168.—Fig. 3.

Electric Cooking at Camp.

During the recent camp of the Nursing and Ambulance Brigade at Worthing, Eng., electricity taken from the municipal mains was used for cooking meals for about 130 persons. The kitchen staff had previously had no experience of electric cooking but they in a few hours were quite efficient in using the Tricity cooking ranges and other apparatus which was installed in one of the tents.

THE ELECTRIC RAILWAY ASSOCIATIONS' CONVENTIONS.

Important Gathering of Electric Railway Men at Atlantic City, October 13 to 17.

The annual convention of the American Electric Railway Association and its allied and affiliated bodies, comprising the Accountants, Engineers, Claim Agents and Transportation and Traffic men, was held at Atlantic City, N. J., from October 13 to October 17. Sessions were held in the mornings and afternoons of each day, a feature of the convention being the joint meetings of several of the allied organizations.

American Electric Railway Association.

In calling the meeting of the American Electric Railway Association to order, Gen. George H. Harries, president, delivered a noteworthy address on the purposes and ideals of the organization and the relation of the public-utility operator to present conditions of economics and public appreciation of the service rendered by the public utility. Unless there is some miraculous intervention, General Harries says, there is promise that to many companies will speedily come the time when the financially "irresistible" will collide with the popularly "immovable." This will come in a succession of more or less destructive experiences; now here, now there, resulting, on one hand, from the broadening of city borders, and the consequent extension of lines, forcible multiplication of transfer points, compulsory wage increases, conscienceless taxation, arbitrary and unreasonable service requirements and growing cost of construction and maintenance; and, on the other hand, from the fixed, or, rather, diminishing fare. Public transportation was never so cheap or of such excellence as it now is. Never has the desire to render the maximum of service for the minimum of cost been more sincere or effective. Never has there been so much of expensive comfort for the patrons or so much of costly discomfort for the companies.

President Harries continued that the most potent solution of the present situation is by a liberal use of the educational force of publicity. By this he meant publicity handled locally to meet local conditions, and the information bureau of the Association should be utilized to its fullest extent. The establishment of alert representatives at the nation's capitol is more than ever necessary owing to the vigor with which legislative bodies are supplementing the methods of the Interstate and state commissions.

The report of the secretary-treasurer showed total receipts of $70,569.22, with expenditures from October 7, 1912, to October 14, 1913, of $52,881.45.

The Cleveland Situation and the Low-Fare Problem.

A paper presented by C. N. Duffy, vice-president and controller of the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., on "The Cleveland Situation," reviewed the economies of the Cleveland railway situation as developed in the 1913 arbitration decision. The paper concludes that the Cleveland franchise plan did not meet the Cleveland situation because the service is inadequate and unsatisfactory; because the cost of service is greater than the receipts from the rates of fare prescribed by ordinance if proper allowance and provision was made for insurance, reserve, etc.; because the capital value as determined by the ordinance does not represent what the investment in the Cleveland system was or what the investment in any other similar system would be operating the same amount of trackage; because the rate of return—on bonds, five per cent; on bills payable, six per cent; on capital stock, six per cent—and adequate margin of safety are not sufficient to compensate investors properly for the risks incident to the hazards of the street-railway business; because there is no assurance that the capital value, as determined by the ordinance or experience in its interpretation after more than three years of operation, will be unimpaired at the expiration of the franchise; because of the rather general recognition that street-railway transportation in Cleveland is being furnished at less than cost, and that any disturbance of present conditions would result in a book deficit.

In discussing this paper, F W. Hild, general manager of the Portland Railway, Light & Power Company, Portland, Me., took exception to the statement by Mr. Duffy that the riding habit in the city of Cleveland averages higher than other cities of its class, and that an increase in the rate of fare would tend to decrease the riding habit. Mr. Hild contended that the riding habit would vary in different cities according to the topographical conditions of the city, the climatic conditions and the natural tendency of the people to spend liberally or otherwise. In reply Mr. Duffy stated that his figure and statements applied only to the facts as he found them in Cleveland.

An important contribution to the convention was the paper entitled "Franchise Values," by William M. Wherry, Jr.

Franchise Values.

The advantages which the owner can derive from any property fall into three classes. First, those of mere enjoyment. We may use the thing owned. It may be of no use to us except as a possession. In the second place, we may regard it as something which we can dispose of in exchange for other advantages. In the third place, we may, by using it derive a profit or income from it. A franchise, in the broadest sense of the term, has all these elements of value, but the element of special value in any special franchise is the power to produce an income or profit out of the exercise of that franchise.

A franchise is not a commodity, the value of which can be arrived at by collating and comparing market prices. Furthermore, franchises are often given away, and in the great majority of cases cost nothing, the reason being that the use of them alone can give them value. The confusion of value with cost gives rise to the fallacy that because a thing cost nothing it has no value. A thing may cost nothing and yet have a great value due to its marketability or the profits which can be derived from its use. In the case of tangible property, this is universally recognized. In the case of intangibles, it is now established, but the notion persists in some quarters that because franchises cost nothing they have no value which the law is bound to respect.

The value of the franchise as based on its earnings cannot be omitted in ascertaining the property which the law must protect and which can only be taken by due process; such value can only be taken away when the charge is clearly extortionate or unreasonable as compared with the service rendered, otherwise the State becomes the extortioner and not the protector against extortion.

In arriving at the question of what is a proper charge for the services rendered, the significance of the unearned increment should not be lost sight of. There are cases where the unearned increment is not a return for any service. For instance, in England there has been a land-holding class where titles have changed comparatively little for centuries. These land owners have performed no service to the community. Each unearned increment value contributed by the community at large bears no relation to any service rendered by the land holders. This is very different from the case where the person who benefits by the unearned increment actually performs a service which is measured by this increment. For instance, a franchise unused is of no value. The man who develops and uses it is performing services and the value which

accrues from such use and development is the measure of those services. The consideration for the development of the franchise is this value, and it cannot be taken away without depriving those who have created it of the reward for their services.

Other papers of interest included the report of the Committee on Welfare of Employees, presented by J. J. Burleigh, second vice-president of the Public Service Railway Company, Newark, N. J., "Profit Sharing with Employees," by W. F. Ham, vice-president, Washington Railway & Electric Company, Washington, D. C., and a paper on a similar subject by H. A. Bullock, of the Brooklyn Rapid Transit Company, Brooklyn, N. Y.

The report of the committee on the gold medal awarded the medal to C. N. Duffy for the best paper read before the company section during the year.

The report of the Committee on Joint Use of Poles elicited a considerable discussion and was referred back to the committee to ascertain the sentiment of the Association members with respect to the contract and specifications therein set forth, this committee to report at the mid-year convention.

Election of Officers.

The following officers were elected for the ensuing year:

President, Charles N. Black, San Francisco, Cal.

First vice-president, C. Loomis Allen, Syracuse, N. Y.

Second vice-president, Charles L. Henry, Indianapolis, Ind.

Third vice-president, John A. Beeler, Denver, Colo.

Fourth vice-president, L. S. Storrs, New Haven, Conn.

The Engineering Association.

In the annual address to the Engineering Association, Martin Schreiber, president, called especial attention to the preparation of the Engineering Manual as an important development in deriving and improving methods for adopting standards and recommended practice. He also called attention to the large interest that is being taken in the study of electrolysis and the appointment of a national committee which has been created to investigate this subject in connection with other interested national societies and technical bodies. The Engineering Association will be represented on that committee.

The Engineering Manual.

The Committee on Standards appointed a subcommittee to prepare a manual of existing standards and recommended practices. The leaflets describing each standard or recommended practice are printed separately and the collection is contained in a flexible binder with space for the addition of further standards as they may be adopted. Two different colors of paper are used. Blue indicates a standard or recommended practice, and white indicates recommendations. The illustrations, where possible, are full sized and printed on thin paper so as to permit of blue-printing. The manual is divided into six general classifications. namely, building and structures, power distribution, equipment, power generation, miscellaneous and way.

Upon motion the manual was approved as the first order of business in taking up the discussion of the report of the Committee on Standards. The report of this committee was presented and the suggestion made that if there were any objections or suggestions that they be forwarded to the Executive Committee.

Power Distribution.

In presenting the report of the Committee on Power Distribution, G. W. Palmer, chairman, called attention to a proposed specification for rubber wire in cable in two grades. This he thought represents a step in advance, particularly on the second grade, of which there has been nothing existing in the past. Two grades of insulation are proposed. One, to be known as 30 per cent para rubber, shall be made exclusively from dry, fine para rubber of the best quality, which has not been previously used in a rubber compound, solid waxy hydrocarbon, suitable mineral matter and sulphur. The compound shall not contain red lead or lamp black. It shall conform in chemical limits with the requirements of the committee appointed by the Rubber Conference of December 7, 1911, New York. The intermediate grade shall have a compound which, when analyzed by the procedure to be specified, will show not less than 27 per cent of rubber gum.

The consideration of the revision of the trolley-wire specification has been continued in connection with a subcommittee of the American Society for Testing Materials. Specifications were also presented for concrete poles, wooden and iron poles. The previous standardization for the overhead crossing of electric light and power transmission lines has been revised as a result of the consideration of the subject jointly by a committee of the various associations that originally formulated it.

Buildings and Fire Protection.

The report of the Committee on Buildings and Structures discussed the general arrangements, the type of construction, the facilities for employees, shop construction, heating and lighting, ventilation and construction details. There was also an appendix relating to the report of a subcommittee on fire protection rules. This discussed in detail the organization of a fire brigade. The report states that the presence of aerial electrical structures in or near a plant or building may operate to hinder the work of the fire brigade through fear of the consequences of an electrical contact with the hose streams. In order that the men may not be unnecessarily exposed to such dangers and that the actual danger may not be overestimated, thereby delaying the work of fire extinguishers, it is important that the men be fully informed as to actual conditions and dangers and how to avoid them. It would be a safe and very proper practice to give actual demonstrations with those conductors where there would be no harmful result. At times it may be necessary to shut off the electric current or to cut service wires. Such work should only be done by persons familiar with electric work.

This report elicited some considerable discussion, and the suggestion of the committee that before final approval be given to the suggested code of rules they be referred back in order that they may be put before the electrical committee of the National Fire Protection Association, was adopted.

Cost Accounting.

The report of the Joint Committee of the Accountants' Association and the Engineering Association on Engineering Cost Accounting provoked some very interesting discussion. Mr. Davies, who presented the report, called particular attention to the necessity for a thorough understanding of engineering cost accounting because of the impending supervision of the Interstate Commerce Commission and state and local governing bodies. It would be quite necessary in establishing valuations to have engineering cost accounting assist in the determination of accurate figures. William McClellan was of the opinion that cost accounting, particularly on large work, should be an extension of the auditing department and in some way under the oversight of the engineering department.

H. H. Adams was of rather the same opinion.

W. R. McRae stated that although an auditor considered that the engineer usually had a pretty fair understanding of accounts, he thought that a little more co-operation between the engineering and the accounting departments would solve the problem very satisfactorily. R. E. Stearns was rather doubtful of the ability of

the engineer to understand accounts. He was not as favorably inclined as Mr. McRae. Through a proper study of the subject, however, there would be more attention paid to cost accounting.

Phillip F. Maguire thought that the time keeping should be under the jurisdiction of the engineering and maintenance of way department, but that the different charges and accounts should be followed up and supervised by the general auditor to a certain extent. In a great many cases the time keeper would make a charge which, to his knowledge, was correct, but when it reached the auditing department the auditor might see a justification for putting this charge into another classification. The idea of carrying accounting by the engineering and auditing departments separately created an extra item of expense, which should be unnecessary.

President Harries, of the American Association, congratulated the joint session on its ability to get together. Where each element would do its best to help the other the right kind of progress should be made.

Officers of the Engineering Association.

At the conclusion of the Friday session the following officers of the Engineering Association were elected for the ensuing year:

President, J. H. Hanna, Washington, D. C.

First vice-president, L. P. Crecelius, Cleveland, O.

Second vice-president, John Lindall, Boston, Mass.

Third vice-president, B. F. Wood, Altoona, Pa.

Secretary and treasurer, E. B. Burritt, New York City.

Executive Committee, E. R. Phillips, Pittsburgh, Pa.; Norman Litchfield, New York; H. F. Merker, East St. Louis, Ill., and J. P. Barnes, Syracuse, N. Y.

Transportation and Traffic.

The report of the Committee on Individual Membership of the Transportation and Traffic Association showed that during the year the membership had been increased by 225 members, so that the total membership is now well in excess of the 500 mark.

In discussing the subject of training of traffic employees, N. W. Bolan considered that disaster would surely follow enthusiasm over efficient methods and scientific management if it resulted in making the employee a piece of machinery whose maximum output is the chief concern. A supervisory force, thoroughly imbued with a spirit of personal interest in every platform under its direction, and trained in character study was in his judgment worth infinitely more than a similar number of the best efficiency experts obtainable. With loyalty born of good treatment and confidence resulting from constant exemplification of the fair deal a tremendous force for good is developed in the rank and file which cannot be secured under any other method of training.

Mr. Bolan continued that the idea of not paying for breaking-in time is fundamentally wrong and open to debate. There was no reason why a student motorman or conductor, probably with a family dependent upon him for support, should be compelled to spend a week or ten days learning his duties without compensation.

Joseph J. Choate was of the opinion that the service of a motorman who goes into the organization to make it a part of his life work is paid for by the use he makes of his position, and he thought that the applicant should be encouraged to realize that he should make the most of his opportunity and pay for his instruction while securing it.

Transportation and Traffic Officers.

Officers of the Transportation and Traffic Association were elected as follows:

President, D. A. Hegarty, New Orleans, La.

First vice-president, M. C. Brush, Boston, Mass.

Second vice-president, H. A. Nicholl, Anderson, Ind.

Third vice-president, L. C. Bradley, Dallas, Tex.

Secretary and treasurer, E. B. Burritt.

Executive Committee, J. K. Choate, New York, N. Y.; Bruce Cameron, St. Louis, Mo.; C. B. Wells, Denver, Colo.; R. E. Danforth, Newark, N. J.

Retirement of Secretary Donecker.

H. C. Donecker, who retires as secretary of the American Electric Railway Association, was the recipient of several resolutions tendering to him the grateful acknowledgment of the organization for services well and faithfully rendered. Mr. Donecker has consented to become chairman of a ways and means committee, which will have oversight of many of the problems which are now confronting the incoming administration. Mr. Donecker's successor, E. B. Burritt, has been the Washington representative of the Association for several years.

Exports of copper for the week ending October 16 totaled 6,779 tons; since October 1, 15,221 tons; same period last year 13,740 tons.

The New York Electrical Show.

The Electrical Exposition and Motor Show of 1913 has been open from October 15 to 25 in the Grand Central Palace, New York City. Three floors of the building were used for the purpose of exhibits, of which there were over 100.

Notable among the exhibits are those of the United States Government as represented by the Departments of Agriculture, Treasury, War, Navy and Commerce. The Forest Service illustrated with models and pictures the measures which the Government is taking to protect the national forests. The Bureau of the Census showed motor-driven machines for tabulating, punching and sorting the card records from which statistics of the country are made up. The Isthmian Canal Commission exhibited a model of the Pedro Miguel lock. The Bureau of Mines showed an anthracite coal mine in operation in miniature, the lighting and all of the operations being carried on by means of electric current.

The Bureau of Standards showed the method of testing various types of commercial electrical measuring instruments, as well as transformers. There were also exhibited standards for use in electrical and magnetic testing. The effects of electrolytic corrosion were also demonstrated. In connection with the Bureau of Navigation there was a radiotelegraphic exhibit, including the apparatus used by federal inspectors in making measurements at radio stations. Among other things the Kolster decremeter was shown. George W. M. Vinal and Frederick A. Kolster were in attendance.

The Reclamation Service showed the application of electricity in reclaiming waste lands. The exhibit included a model of the great Roosevelt dam in Arizona. The Treasury Department showed a fully equipped mint in operation. The Navy Department exhibited the bridge of a battle ship to demonstrate the electric signaling devices used. The War Department demonstrated field wireless sets in operation and time-firing apparatus for coast-defense guns.

The state of New York had an exhibit showing models of locks on the Mohawk River.

The Bureau of Municipal Research demonstrated advances in the conduction of municipal affairs.

Several central-station companies were represented. The New York Edison Company demonstrated the advances in electrotherapy in a model hospital. Among others, there were an X-ray room, an operating room, a therapeutic room and a sterilizing room. Among the apparatus used were high-frequency machines, an ozonator, sterilizer, mercury-vapor lamp and a magnet for removing iron particles from the eye. The company also had other exhibits in different parts of the building. One of these represented an

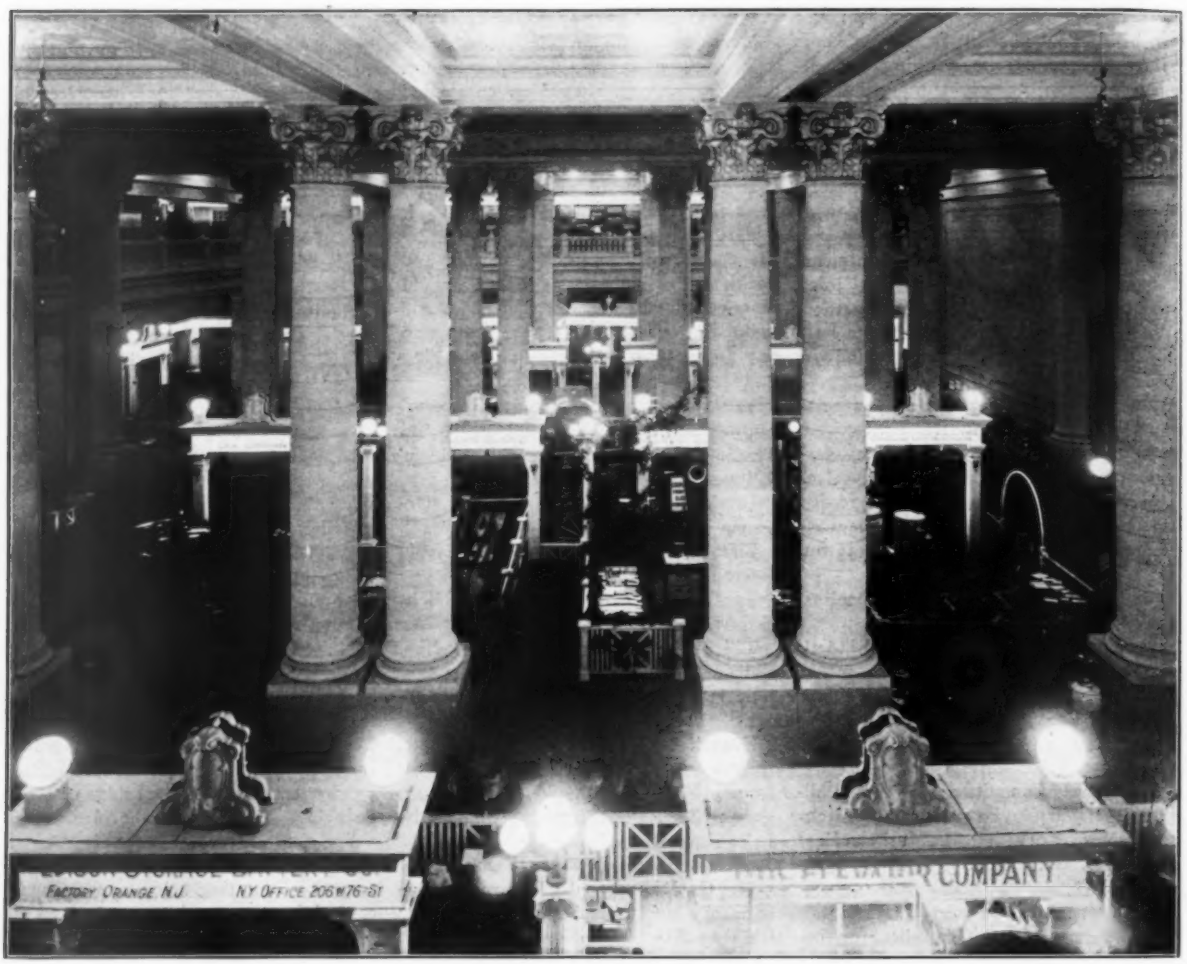
electric farm, in which everything was electrically operated. The apparatus included incubators, milking machines, butter churns and farm machinery. Cows were on hand so that it was possible to actually carry out all the usual dairy operations. Chickens were hatched daily and water was pumped by means of electrically driven pumps. In another portion of the building the company operated an electrical restaurant. There was also a model laundry and bakery, which was operated by electricity.

homes using electric service, with statistics showing the growth of the company.

The New York & Queens Electric Light & Power Company showed views of electrically operated factories and displayed domestic appliances.

The New York Electric Vehicle Association had in operation a model garage which was complete in every respect for the service of electric vehicles. It contained a battery-charging equipment consisting of a 30-ampere mercury-arc rectifier and a charging panel for six circuits.

a new type supported from cables for the center of a large room; a floor style for imbedding in concrete, and the vehicle type. Both plugs and receptacles are steel-incased so that the weight of hanging cables is well supported without dragging on the contacts. Another feature is the time switch, which will automatically open a charging circuit at the end of a predetermined period. Time switches for all kinds of windows and sign lighting were also shown. John M. Anderson, W. Ward Hincher, Ernest Woltmann, Alfred Anderson and George Crane were in attendance.



General View of Electrical Exposition in New York City.

The Edison Electric Illuminating Company of Brooklyn demonstrated its house-wiring plan by means of rooms in which the fixtures had been connected. Heating and cooking devices showed what ten cents' worth of electricity would do in this service. Motor drive was also demonstrated.

The United Electric Light & Power Company showed a model electric grill room containing an electric fountain. The company's house-wiring plan was also emphasized.

The Yonkers Electric Light & Power Company showed pictures of attractive

The American Museum of Safety had an exhibit showing various appliances and safeguards for protecting human life.

The following manufacturers and dealers made individual exhibits.

Adder Machine Company, of New York City and Wilkesbarre, Pa., exhibited its latest model of an electrically visible adding machine.

Albert & J. M. Anderson Manufacturing Company, Boston, showed the latest types of battery-charging plugs and receptacles. The assortment was very complete and included a universal-joint garage type for wall mountings;

American X-Ray Equipment Company exhibited X-ray and high-frequency apparatus for physicians and a powerful X-ray outfit for dentists.

Automatic Electric Company, Chicago, showed a 50-unit automatic exchange in operation, establishing a communicating system between booths of the various exhibitors. An interesting innovation with a promising field is the Musolaphone, which through a horn attachment, can be made to produce music while the telephone is not otherwise engaged. This same device can also be used for paging. J. P. Roger and L. J. Le Vine were in attendance.

S. R. Bailey & Company, Amesbury,

Mass., has several cars on exhibition. The model F roadster was brought out in March of this year at the Automobile Show in Boston. The standard battery is 60 A-5 Edison cells, and can even be larger if desired. The maximum speed of the car is 25 miles per hour on the flat and it is capable of maintaining an average speed of 20 miles per hour on average roads with ordinary grades for 75 to 100 miles. The Victoria Phaeton is a car designed especially for ladies' use, equipped with the Edison battery. The seat is large enough to hold three people comfortably. The Service Car, another of the Bailey trio, was designed especially for the use of electric light companies, and there are now more than fifty in their service. Represented by S. R. Bailey.

Bell Electric Motor Company, Garwood, N. J., showed an interesting series of tests to determine the efficiency, power-factor and horsepower of electric motors. Several types are used, among them single-phase, polyphase and direct-current motors. The motors used in these tests are rated at from one to twenty horsepower, and for the tests they are connected with a scale and the Prony brake. In attendance are A. C. Bell, T. R. Bell, A. E. Eckhoff and H. S. Dryer.

Birtman Electric Company, of Chicago, displayed its line of "Bee" vacuum cleaners.

C. C Bohn Electric Company, New York City, exhibited electrical appliances for the home. It was represented by C. C. Bohn, John Davidson and William McKenna.

Burroughs Adding Machine Company made an exhibit of machines of its manufacture.

Clark Thread Company, Newark N. J., exhibited an automatic spooling machine and cotton products.

Conlon Electric Washer Company, Chicago, displayed its electric washing and wringing machine. It embodies many new features in the way of gear drive, inclosed mechanism, reversing device and safety attachments. These machines are made in different sizes, suitable not only for home use, but for hotels, hospitals, institutions and commercial laundries. In attendance were W. I. Conlon, W. T. Haynie and T. H. Phillips.

Consolidated Telegraph and Electrical Subway Company exhibited the modern methods used in underground work. There was a concrete manhole, showing how under-street vaults are constructed. The construction of feeders and distribution cables was also shown, together with the different methods of making connections for city lighting and customers' service.

Dodge & Zull, Syracuse, N. Y., showed in operation their Easy electric washing machine. W. Zull, W. B. Hart and F. W. Pierce were in attendance.

Duntley Vacuum Cleaner Company, Chicago, showed the new fan-type vacuum cleaner, which displaces 150 cubic feet of free air per minute, with no back pressure to overload the motor.

Thomas A. Edison, Incorporated, exhibited the Improved Edison Dictating Machine. A practical demonstration was given by the Seely Office Appliance Company, which distributes this device in New York, Newark, N. J., and adjacent points.

Edison Storage Battery Company, Orange, N. J., shows various types of batteries and apparatus used with them. The different parts and methods of manufacture were shown by samples, giving all the essential details of the Edison cell. An Edison alternating-current rectifier was shown in operation connected to the alternating-current supply and furnishing direct current for charging. An interesting feature of the exhibit is a display board loaned by the General Electric Company, containing its standard electric-vehicle equipment—motor, starting rheostat, controller, instruments, etc. The apparatus is wired up and connected to an Edison battery. Applications of

Another View of New York Electrical Show.

the Edison battery to lighting country homes, farms and churches, the ignition and lighting of gasoline automobiles, yacht and motor boat lighting, are shown by samples of the special apparatus used. William Andrews, W. G. Bee, Charles Pover, H. R. Leisk, John Kelly, C. E. Foster and Charles Clare were in attendance.

Eimer & Amend, New York City, displayed electrically heated and operated apparatus for hospitals, physicians and laboratories, the Freas electric incubator, the Freas electric oven and other apparatus.

Electrical Review and Western Electrician exhibited bound volumes and recent copies of the journal and important electrical books.

Electrical Testing Laboratories, New York City, exhibited a model street, showing in miniature the various types of lighting employed at the present time and indicating some problems which are to be met in the successful illumination of streets. In addition several of the newer types of illuminants which are at present in experimental stages and have not yet been introduced commercially. In attendance were N. D. MacDonald and A. J. Folz.

Electrical World, New York City, had on hand copies of current issues, books, etc.

Electric Fountain Company, New York City, displayed a line of its electric fountains.

Electric Storage Battery Company, Philadelphia, had an interesting display. A motor-driven apparatus illustrated the use of the Exide starting and lighting battery. This apparatus, by means of headlights, side-lights, tail-lights and a bank of lamps, was put through a cycle of operations and showed on indicating instruments the amount of current delivered from the batteries for each of the applications. An illuminated transparency showed photographs of an electric pole-truck, an electric ice-wagon, an electric fire engine and a storage-battery car, each of them being equipped with Exide batteries. Samples of plates and battery trays and a number of photographs completed the exhibit. The company was represented by Albert Taylor, F. L. Kellogg, D. P. Orcutt, W. B. Bowie, W. O. Knudson and R. R. Whitehurst.

Empire Electric Vehicle Company, Owego, N. Y., showed two models of the Champion electric vehicle, which are handled in the East by the Henry Tobin Company. The 750-pound vehicle known as Model B, is shaft-driven and equipped with General Electric 48-volt motor and 24 cells of battery, carried under the driver's seat. The 1,000-pound capacity vehicle, known as Model A, is also shaft-driven and its equipment consists of an 85-volt motor and 42 cells of battery, disposed as in Model B. Represented by A. H. Chadbourne.

Eureka Sales Company exhibited Eureka electric specialties, including massage vibrators, high - frequency machines, hair driers and vacuum cleaners.

Federal Sign System (Electric) showed electric miniature letters, and electric power table, which performs almost any kitchen task. Other things in this booth were various types of electric signs, electric washing machines, vacuum cleaners, heating devices, and fixtures, Sangamo meters, Pittsburgh transformers and electric specialties. In attendance were W. W. Tower, C. B. Graves, L. E. Spurrell and S. I. Levy.

Oscar O. Friedlander, New York City, arrayed a pleasing display of electric lighting fixtures and pendent shades. Among the interesting and attractive articles were Cristoleer domes and showers. Albatrix bowls were another type of lighting ornament on exhibition, and of special interest is the new Reflectophane.

Gas and Electric Sign Company showed how commercial possibilities are greatly enhanced by the use of a patented glass prismatic lens. Signs are of the varnished box type, the letters or pictures being pricked out by the lenses. The finished product is a weatherproof sign illuminated from the inside by a few high-power lamps.

General Acoustic Company presented a complete equipment of the Dictograph Interconversing System in full operation, including a loud-speaking master station and secret circuits, all working without a switchboard or operator or the employment of either earpiece or mouthpiece.

General Electric Company demonstrated the superiority of illumination by Mazda lamps over that by carbon lamps. For the purpose of giving a general idea of the process in the manufacture of a Mazda lamp, there was a cabinet displaying lamps or parts of them as they appear at the end of each step in their construction. A separate cabinet contained a comprehensive exhibit of miniature Mazda lamps suitable for sign lighting, Christmas-tree lighting, and decorative lighting in general. There were two attractive demonstrations showing the stability of the Mazda lamps as now constructed. A runabout-type rectifier for charging the batteries of electric runabouts, stanhopes, and broughams at home was exhibited. Ozonators representative of the line manufactured by this company were exhibited in operation. A comprehensive display of heating and cooking devices was shown, including irons, water heaters, heating pads, toasters, corn poppers, percolators, chafing dishes, grill water pans, disk stoves, radiators, air heaters, beer vat driers, glue pots, soldering irons, teakettles and samovars. In the arc-lamp exhibit were flaming arcs, luminous arcs and the types of ornamental luminous arcs known as "White Way," "Residential" and "Park Way." The color-matching outfit was also displayed. The company was represented by F. H. Gale, W. H. McLaren, J. S. Hartman, T. Beran, A. D. Babson, W. W. Jones and B. C. Sprague.

General Motor Truck Company, Pontiac, Mich., displayed a three-ton electric truck in its booth. This truck embodies many novel features never seen before. It was so assembled that the body is cut in half. One side gives a view of the chassis and its working parts. The other half shows a section of the body finished in black and gold, which with the contrasting cream white of the chassis is a very pretty color combination. Represented by C. B. Warren, J. Kinsey, J. H. Cafferty, D. R. Jones and C. T. McManus.

General Vehicle Company, Incorporated. Long Island City, N. J., demonstrated the evolution of the electric power wagon. To this end four distinct types were shown, namely: a double-motor pinion drive of 1901 as illustrated by the 1,000-pound wagon, a single-motor chain drive of the 1907 type; a 1,000-pound chassis and a 1,000-pound wagon complete, in 1914 shaft-drive model; also a two-ton chassis featuring the new controller box and the exclusive conduit-wiring refinements recently added by this company. Represented by E. W. Curtis, Jr., A. P. Bourquardez, W. L. Brown, W. W. White, S. J. West, R. W. Maginniss, J. B. Fink, F. N. Carle and G. N. Stanton.

Gould Storage Battery Company showed an interesting exhibit of the various uses of the storage battery, including batteries for automobile and for central-station use. Vehicle batteries, and those used in storage-battery cars were shown complete, a number of cells being connected and set up in trays. Besides sections of larger batteries there were also shown types of batteries used for lighting automobiles and for automobile self-starting equipment. : Representatives in attendance were Frank J. Dowd, R. C. Hull, S. D. Cowl and George Hayes.

Habirshaw Wire Company, of New York City, arranged a novel display of its products. There were Habirshaw wires, cables and cores for all services and for high and low pressure. Of special note are the new Red Core and Black Core Code wire, signal, submarine-mine, torpedo and underground cables. Representatives present were J. B. Olson, R. S. Satterlee, H. E. Stevens, Jr., and William Kenetz.

Hanover Chemical & Manufacturing Company exhibited quartz-tube mercury-vapor lamps for the treatment of skin diseases, organic diseases and other purposes.

Hotpoint Electric Heating Company, Ontario, Cal., exhibited heating and cooking devices. It was represented by H. A. Lewis, H. L. Wittnebel, F. P. Combier and J. V. Guilfoyle.

J. W. Hughes Company exhibited electro-surgical apparatus, X-ray coils, high-tension transformers, vibrators, etc.

Hurley Machine Company, Chicago, exhibited the Thor electric home laundry machine, which is made in thirty-six styles and sizes. In addition to showing a machine actually doing the washing there were also white-enamel and solid-porcelain machines of the stationary type, equipped for water and drain connections. The company also demonstrated the Hurley Six and Hurley Four vacuum cleaners, which it has recently perfected after exhaustive tests. Represented by Neil C. Hurley, Myer Hurley, E. N. Hurley and N. H. Harberle.

Innovation Electric Company showed Magic electric vacuum cleaner.

H. W. Johns-Manville Company, New York City, exhibited the Audiffren-Singrun refrigerating and ice-making machine in operation. A number of interesting specimens of J-M Transite Ebony Asbestos Wood were also shown. J-M Fyro fire extinguisher, was also shown. The J-M Fyro is of the one-quart type and discharges a liquid that has forty times the effectiveness of the usual soda and acid solutions. Among the electrical products

exhibited were a number of Noark protective devices, including Noark fuses and blocks, Noark service boxes, Noark subway boxes, etc. Meter-testing devices and J-M fiber conduit were also included. Representatives in attendance were W. S. Kilmer, Charles Wyatt, A. C. Curtis, M. R. Burn and B. L. Tinkham.

Keller Manufacturing Company, Philadelphia, through the Santo Electric Appliance Company, Incorporated, displayed the various models of Santo vacuum cleaners.

The Kinetic Engineering Company, Philadelphia, Pa., exhibited the Kinetic organ blower in operation, demonstrating its superior mechanical construction. S. H. Ebert and T. W. Watson were in attendance.

E. Machlett and Son showed chemical, physical and bacteriological apparatus and laboratory supplies, including X-ray tubes, vacuum electrodes, etc.

H. W. McCandless & Company, New York City, manufacturers of miniature incandescent electric lamps of every description and for every imaginable purpose, had an interesting exhibit of its tiny wares. One of the special features was the comprehensive display of lamps.

Manhattan Electrical Supply Company, New York City, displayed a large line of household appliances, the Premier vibrator, wireless telegraph apparatus, the Red Seal battery, electrical toys, etc. In attendance were E. W. Whitmore, J. J. Hart, N. Walker and others.

Martini & Hueneke Company of America, demonstrated the storage and distribution of gasoline and other inflammable liquids.

Metropolitan Engineering Company exhibited several new developments which will be of material interest to central-station men. The exhibit included a working model of the alternating-current network protector designed to eliminate the troubles characteristic of transformers that develop defects when several are connected in parallel; also a model of the Metropolitan prismatic electric bath cabinet, which is designed to be folded into a comparatively small space. A display was also made of devices for the protection of service and meters, samples of the Metropolitan porcelain panel-board units, porcelain sealable service cutouts, series arc-lamp switches for use on primary circuits, primary cutouts and fuses, subway cable hangers, subway branch blocks, as well as various types of devices for the sealing and protection of unmetered services and electric meters. Represented by G. R. Smith and R. B. Sammis.

E. B. Meyrowitz, Incorporated, exhibited high-grade electrical apparatus for physicians and surgeons, including a large magnet for removing particles of steel from the eye.

J. L. Motts Iron Works, New York City, showed a line of electroliers for street lighting and buildings. An attractive feature of this exhibit was an artistic electric fountain. Those in attendance were Reed Adams, M. J. Moroney and A. F. Mulvihill.

Mowbray Company, New York City, showed a general line of household appliances. One of the features of particular interest was a demonstration of preserving fruit, jam and jelly by means of an electric process which not only thoroughly sterilizes the preserves but owing to its quick action retains the natural color of the fruits. There was also shown at the Mowbray booth an electric sign, an invention of Mr. Mowbray.

National Lamp Works of General Electric Company, Cleveland, O., exhibited a device which subjects a Mazda lamp to very rough usage and shows beyond a doubt that the lamp will stand up under most trying conditions. The apparatus is motor-operated and yanks the lamp to and fro, while a counting machine records the number of bumps. The strength of the drawn-wire filament, even after burning, was strikingly shown by a lamp, the bulb of which had been shattered, and whose stem had been broken without breaking the filament. Attached to the lower portion of the broken stem was another lamp whose weight was supported entirely by the filament of the broken lamp. The vacuum of incandescent lamps was demonstrated by means of two lamp bulbs, one exhausted and the other filled with air at atmospheric pressure. Both bulbs contained small electric bells operated by push buttons. The ringing of the bell in the one is readily heard, while the ringing of the other is not. The new method of winding the filament in so-called concentrated-filament lamps was shown by an enlarged model of the filament. The various steps that enter into the manufacture of the lamp, from raw material to finished product, was clearly explained by a paragraph story. The device has a series of panels upon which the component parts are mounted; these are mechanically brought into view, one at a time. The exhibit contained a number of colored advertisements which were successively brought into view in the rear of a darkened box. Manipulation of the colors of the light sources causes each of the pictures to go through a number of startling changes. Closely related to the above exhibit was another, also adapted from Mr. Luckiesh's demonstration, which shows the effect of the direction of light upon a piece of statuary. Typical pieces of Holophane glassware were arranged about the booth. The Tungstolier True-Tint cabinet showed the advisability of having the proper quality of light for color matching. This unit offers artificial daylight by using Mazda lamps with properly colored screens. In charge of the exhibit were R. W. Tavey and R. W. Davis.

New York Electrical School exhibited photographs of the departments of the school and a portion of its equipment, as well as samples of the drafting done by the students. Representatives present were George J. Cox, J. L. O'Connor and C. V. O'Brien.

The Nicholas Powers Company, New York City, exhibited a line of Powers cameragraphs.

H. Northwood Company, Wheeling, W. Va., exhibited a large selection of commercial spheres, hemispheres and bowls in Luna glass, Empire and Gothic bowls in beautiful designs, commercial shades in bowl, bell and flared shapes adapted to the minimum and maximum requirements of tungsten limps, as well as a splendid assortment of ornamental shades in pearl luster, irridescent, amber and gold decorated types. Messrs. Cantine and Wilcken were in charge of the exhibit, assisted by D. A. Taylor.

Otis Elevator Company exhibited a motor-driven inclined freight elevator in operation. The inclined elevator is made in several types to meet all conditions of indoor traffic service, and the particular type on view has a capacity of 600 trucks per hour, can be reversed, and operates at a very small cost. In addition to the operating exhibit, the company showed by means of a series of photographs, which move in consecutive order before the eyes of the audience, the uses and advantages of escalators and gravity spiral convoyors. Representatives in attendance were M. S. Baldwin, A. E. Handy, F. E. Towne, W. W. Lighthipe and H. F. Miller.

Philadelphia Storage Battery Company exhibited vehicle and portable batteries. The vehicle batteries illustrated the types which have been standard from time to time and concentrated on the thin-plate types WT and WTX. The various advantages of these along the lines of mileage, speed and life, were graphically shown on a diamond-shaped table lighted from beneath. The strength of the Diamond Grid was illustrated by means of scales built out of standard Philadelphia Diamond Grids. Sample trays from various well known makes of electric vehicles were also exhibited. A revolving showboard contained a collection of the various plates and other parts used in the construction of Philadelphia batteries. The non-leaking terminal as well as other features of Philadelphia portable batteries was illustrated by means of a "cut-open" battery. Represented by Walter L. Thompson and R. H. Macintyre.

Philip Morris & Company, Limited, showed a motor-driven machine for making cigarettes.

Prometheus Electric Company arranged an inclusive display of household cooking and heating utensils. An electric food and plate warmer, several sizes of electrically heated sterilizers for doctors' and dentists' instruments, and for water were demonstrated. Air heaters for cozy corners and bathrooms were shown together with water heaters for permanent connection to the water piping. The company's heating unit was shown and explained with examples of special applications. W. H. Ripley and Mr. Snyder were in attendance.

Regina Company, New York City, demonstrated the latest models of the Regina vacuum cleaner.

Rhineland Machine Works Company exhibited three makes of high-class ball bearings, made by the Société Française des Roulements á billes, Paris; the Maschinenfabrik Rhineland, Düsseldorf, Germany; and the Fafnir Bearing Company, New Britain, Conn. J. H. Blackford was in charge.

Rotor Vacuum Cleaner Company, Incorporated, New York City, demonstrated Rotor vacuum cleaners.

Runkel Brothers, Incorporated, showed electrically driven cocoa and chocolate machinery.

Sheldon Electric Company demonstrated vibrators, hair driers, etc.

Shipley Construction & Supply Company, refrigerating engineers and contractors, showed a four-ton York refrigerating machine in continual operation, cooling the water for two

drinking fountains and maintaining a low temperature in a refrigeration box. A ten-horsepower motor runs this machine. A duplicate refrigerating machine was shown in sections.

The Simplex Electric Heating Company, through Roger Williams, of New York, arranged a display of one of the most complete assortments of electric heating apparatus manufactured. This included everything, from electric ranges, and laundry appliances of all kinds, down to the dainty nickel-plated table utensils. Among the features of this year's wares are a number of new ranges and a complete new set of devices for cooking at the table. In attendance were Roger Williams and Clyde Flint.

Clarence L. Smith Company, New York City, exhibited a five-ton couple-gear truck, which had been converted from a horse-drawn vehicle. It was represented by John H. Kennard, R. McNally and N. E. Smith.

Snook - Roentgen Manufacturing Company, Philadelphia, showed electrotherapeutic apparatus, X-ray coils and tubes, fluoroscopes, high-frequency resonators, etc.

Standard Electric Car Company, Jackson, Mich., showed its electric coupé and a stripped chassis. It was represented by F. L. Morgan, J. J. Flynn and C. H. Hark.

William Truswell and Son, New York City, exhibited an interesting display of photographs of the work of this firm.

Tungstolier Works of the General Electric Company showed a series of very attractive designs, known as the Tungstolier Certificate Line. Of particular interest is the Mazda Monolux Convertible Unit which provides attractive design and highly efficient semi-indirect lighting unit which makes a pleasing installation for commercial work. Representatives were J. R. Colclough and George W. Henry.

Twinvolute Pump and Manufacturing Company, Incorporated, showed a line of pumps especially adapted to supplying water for house service and for the roof tank. It also exhibited pumps especially arranged for sump or drainage work. All of the machinery was shown in active operation under conditions which are met with in actual service. The exhibit was in charge of Mr. Harry P. Prindle.

Vacuna Sales Company, New York City, showed a new model of vacuum cleaner, known as the Vacuna Junior, also the Utility floor scrubbing, grinding and polishing machine, for use on wooden and marble floors.

Victor Electric Company, New York City, exhibited electric, medical and surgical apparatus.

Wagner Electric Manufacturing Company, St. Louis, Mo., showed the Wagner single-phase converter for moving-picture work. This same machine with a different transformer and switchboard is used for battery charging. In addition to this a unity-power-factor, single-phase motor, and a 5-horsepower repulsion induction single-phase motor have an ammeter in series with the main line, which shows that the two motors running together consume less current than either one alone. There were also shown a 15-horsepower and a five-horsepower self-starting wound-rotor motor; a squirrel-cage and a wound-rotor slip-ring type motor. These are all two-phase, 220 volts, 60 cycles. In the rear of the booth a Pelham hoist machine equipped with a Wagner two-phase, 220-volt, 60-cycle, slip-ring hoist motor was in operation under full-load conditions. The booth was in charge of J. F. Alexander of the New York office of the company.

Waite & Bartlett Manufacturing Company exhibited electrotherapeutic apparatus, including high-frequency machines, X-ray coils and tubes, etc.

Wappler Electric Manufacturing Company, Incorporated, exhibited X-ray machines and electrotherapeutic apparatus.

Ward Motor Vehicle Company, New York City, showed a chassis of the type EC, 5,000-pound, commercial truck. Represented by Charles A. Ward and C. J. Appelbe.

Westerberg and Williams, New York City, showed Forbes sterilizer and International disk and sand filters.

The Westinghouse Companies had an extensive exhibit. The display covered a complete array of electrical apparatus, embracing indicating meters, watthour meters, carbon and oil circuit-breakers, rectifier outfits, fans and heating devices. The Westinghouse flame-carbon-arc lamp was on exhibition. In connection with this there were shown complete brackets, reflectors and street-lighting equipments. Among the smaller devices is a 9-inch, 24-30 volt direct-current railway-coach fan. There was also being demonstrated a mechanical rectifier for charging ignition batteries on gas and gasoline engines In attendance were J. C. McQuiston, H. W. Beaumont, H M. Wilson, E. A. Tilden, J. G. Maguire and F. C. Stieler.

First Chinese Electric Railway.

A 25-mile electric tramway, the first in any Chinese city (as contrasted with foreign settlements), was recently inaugurated in the native city of Shanghai. The enterprise is entirely a native one.

Coal and Ash-Handling Equipment at Pacific Mills Print Works.

The completeness of the coal and ash-handling apparatus in the power plant of the new print works of the Pacific Mills, South Lawrence, Mass., shows that large industrial plants appreciate that as much money can be saved by employing up-to-date apparatus in the power plant as by the use of improved machinery in the manufacturing departments.

There are three distinct parts to this interesting equipment. The first consists of a pivoted bucket conveyor which receives the coal from the railroad cars and distributes it into the storage pocket. In addition to this conveyor a motor-driven car distrib-

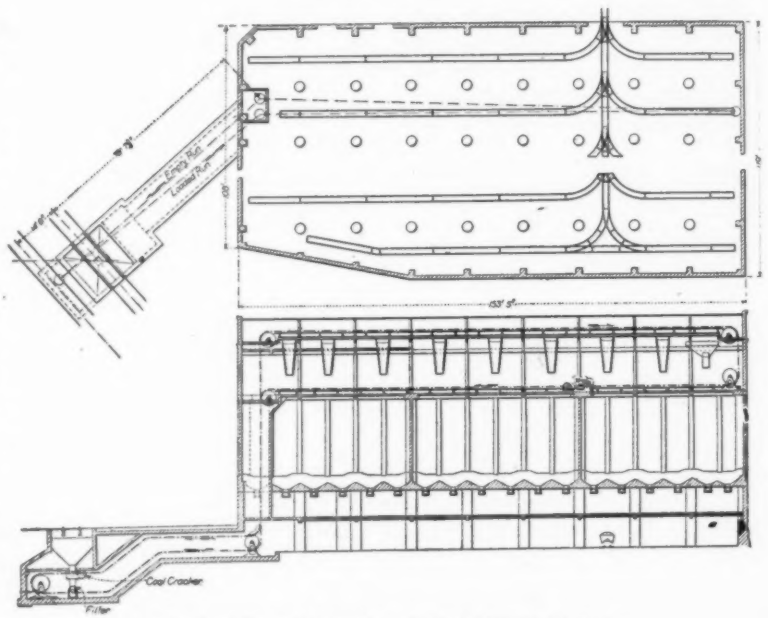


Fig. 1.—Plan and Elevation of Coal-Storage Building.

utes coal to sections of storage pocket not reached by the conveyor.

The second part, consisting of charging cars and an industrial railway, is used to convey coal from the storage pocket to the boiler room.

The third part, consisting of another industrial railway system, is for the removal of ashes.

The course of the fuel is as follows. Coal is brought to the plant in railroad cars of the bottom-dumping type and is distributed directly into a pit under the track. It then passes into a Hunt electrically driven coal cracker, which breaks up the large chunks of bituminous coal into lumps of proper size for firing. The coal cracker discharges through the tunnel, shown in Fig. 2, and then rises, as shown in the rear of Fig. 3, and carries coal to the distributing chutes, each of which is provided with an automatic trip so that the coal

can be discharged from the conveyor buckets into any chute desired. The motor-driven conveyor driver is located on the upper level. The conveyor is driven by a Hunt open-geared pawl driver.

Besides the coal pocket shown in Fig. 3, there is an auxiliary row of storage bins at the extreme left of the building. For filling these bins, the conveyor can be arranged to discharge into an auxiliary hopper as shown in Fig. 4, which is used for filling an electrically operated car of two tons capacity, running on a track over the storage bins.

The bins have a combined capacity of 10,000 tons of coal, but are so subdivided that the individual bins can be emptied in a few minutes in case the coal commences to heat and there is danger of spontaneous combustion.

Consider now the second part of the system. From the bins shown in Fig. 3, the coal is drawn off through duplex valves into Hunt boiler-room charging cars. Although these cars are of one-ton capacity, they can be filled in less than a minute.

The charging cars are now pushed by hand onto the scales shown in Fig. 5, where a complete record of all the coal burned is kept. The cars are now pushed directly into the boiler room. The two outside tracks are so located that the fireman merely drops the side of the car and shovels the coal directly into the furnace. The middle track provides for shunting out empties and running in full cars. This system prevents coal from being spilt around the floor and permits of maintaining an extremely neat boiler room.

The coal cars are designed especially to facilitate firing the coal into boilers. They are made of sheet steel stiffened with angle-iron, the corners rounded off for the workmen's hands and the bottom flush riveted. When the side door is let down, its bottom is slightly higher than the floor of the car, so that the fireman will not catch his shovel when scooping up the coal. These cars greatly reduce the fireman's work and increase his coal-handling capacity because the cars are of just the right height.

This completes the coal-handling equipment, which has a capacity of 60 to 70 tons an hour.

The room underneath the boilers is equipped for the removal of ashes. The ash car is exceedingly interesting as it has been designed so as to be practically dust-proof. As soon as the car is run under the ash hopper, a lever at the top of the car is pulled down and a telescoping spout on the car is shoved up and encircles the bottom of the ash hopper, thus preventing ashes from flying around.

This coal and ash-handling system was designed by Lockwood, Greene and Company; the apparatus was designed and supplied by the C. W. Hunt Company, Incorporated. The trackage, switches, turnouts, etc., are all of the well known Hunt design and the cars have outside-flanged wheels, permitting one man to easily push a one-ton load around a curve of 12 feet radius; this is due to the fact that in taking the curves the outside wheels run on their flanges so that the tread of the inner wheel and the flange of the outer one fall upon the theoretical cone of revolution. The coal pockets, which are of reinforced concrete faced with brick, were built by the Aberthaw Construction Company.

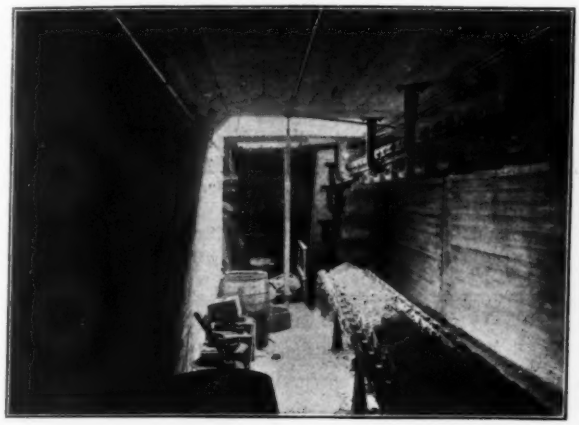


Fig. 2—Pivoted Bucket Conveyor.

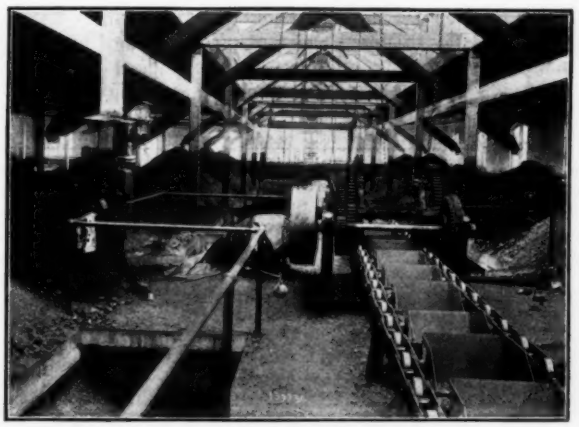


Fig. 3—Motor-Driven Driving Mechanism.

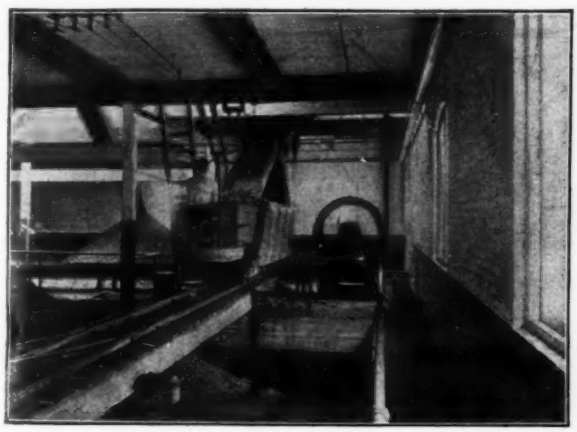


Fig. 4—Electrically Operated Dump Car.

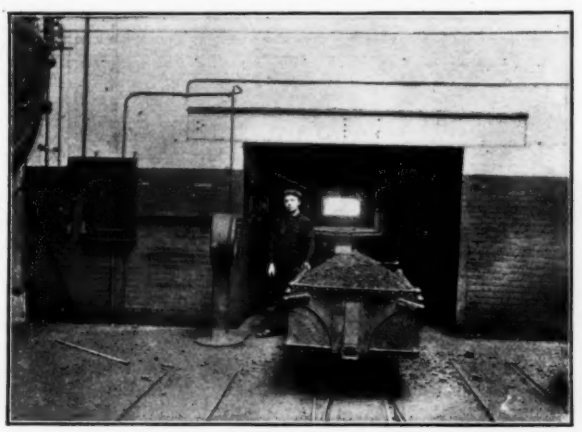


Fig. 5—Weighing the Coal.

TELEPHONE PIONEERS OF AMERICA.

Annual Convention at Chicago, October 17 and 18.

The third annual convention of the Telephone Pioneers of America was held at Chicago on Friday and Saturday of last week; headquarters were at the Congress Hotel. All features of the convention were carried out according to schedule and the gathering was in every respect very pleasant and completely successful. About 330 Pioneers were registered and the total attendance, including guests, was between 500 and 600. Two meetings were held for the transaction of business and presentation of addresses; the rest of the time was devoted to a variety of entertainment features together with a renewal of old acquaintances and the recital of anecdotes, etc.

Left Half of Telephone Pioneers Group at Hawthorne Works of Western Electric Company, October 18, 1913.

Shortly after 10:30 a. m., on Friday, the first session was opened in the Gold Room of the Hotel by President Theodore N. Vail. As he stepped to the platform the large audience arose and gave him a rousing ovation. Mr. Vail made a brief address, expressing first his appreciation of the shift of the dates for the convention in order that he might attend. This third gathering of the Pioneers was really a reunion of a great brotherhood. A large proportion of the Pioneers that were active in the early development of the telephone industry are fortunately still connected with it. The growth of the industry has been marvelous and for several years has been consistently working out the policy of establishing universal service. Mr. Vail said in conclusion that, whether it be ultimately privately owned or government owned, a completely interconnected system furnishing universal intercommunication must be attained.

An address of welcome was then delivered by Bernard E. Sunny of Chicago. He spoke of the pleasure it gave the local telephone men to have with them a host of the old leaders who, by remarkable co-operation and industry, had built up one of the world's greatest utilities. In view of the present high telephone standards, it is difficult to realize that when the telephone had its beginning there were no telephone men who had anything more than a vague notion of how the business should be started. The men drawn into the new field came from all walks of life. In the different licensee companies then formed there was no co-ordination of appliances and methods. The National Telephone Association formed in 1880 helped materially in the evolving of standards of equipment and practice. Still there were many ups and downs and none could foresee the development of the future. In 1887 about 160,000 telephones were in use in the country and the president of the association referred to stated in an address that he thought a telephone development of one-half of one per cent of the population was the largest that could be looked forward to. Now there are over 10,000,000 telephones in the United States and the development is over 11 per cent. Now it is possible to use the same type of instrument in any part of the country and the operating methods and general character of service are the same everywhere. Mr. Sunny said the problems involved in bringing about a comprehensive method of supplying a universal service were extremely difficult and the attainment of such service is an achievement scarcely less important than the invention of the telephone itself. The telephone has been fortunate in the men who have worked out these vexatious problems who at all times have maintained the highest ideals in the conduct of the business. The industry has also been fortunate in its women, whose loyal devotion to duty has won the admiration of the public.

Vice-president Frank H. Bethell then took the chair. Secretary Henry W. Pope presented his annual report, showing the past year to have been a very encouraging one in the activities of the organization. Since January 1 of this year there has been an increase of 164 members and on September 30 there were 1,164 members enrolled. A large part of the new members have been in continuous service in the telephone business for over a score of years. The funds of the Association are also in good condition, there being a cash balance of about $1,500 on September 30 after all obligations were paid.

W. H. Adkins, of Atlanta, Ga., presented a series of invitations from various public officials and commercial bodies of the city seeking to have the 1914 convention of the Pioneers held in Atlanta. This matter was referred to the Executive Committee.

Thomas D. Lockwood spoke of the historical museum of telephones and telephonic apparatus established in New York City by the Western Electric Company and asked members who had early types of telephone apparatus to send them there as exhibits.

Mr. Lockwood also presented a series of amendments to the constitution and by-laws that were drawn up by the committee delegated last year to revise these documents; these amendments were all carried one by one. They related chiefly to a more simplified phraseology; the most important amendment defined more clearly the qualifications for membership as a Telephone Pioneer.

Election of Officers.

The Nominating Committee submitted a list of nominees for officers

for the ensuing year. These were unanimously elected as follows:

President, Theodore N. Vail, New York.

Vice-presidents, Thomas D. Lockwood, Boston; Charles F. Sise, Montreal; Thomas B. Doolittle, Branford, Conn.; George E. McFarland, San Francisco.

Treasurer, George D. Milne, New York.

Executive Committee, Charles G. Du Bois, New York; Angus S. Hibbard, New York; Frank H. Bethell, New York. President Vail also appointed, in accordance with the constitution, E. F. Sherwood, New York, and James T. Moran, New Haven, as members of the Executive Committee.

Mr. Lockwood was then called upon to preside over the meeting as vice-president-elect. He made a brief address, referring to some features in the early history of the telephone, particularly dwelling on the early development of the telephone exchange. This was really an evolution from the telegraphic exchanges, some of which were in use in a crude form as early as 1852. Later there were telephonic ticker exchanges in New York City. He described one of the earliest telephone exchanges that was started in Hartford, Conn., by a druggist and cited a case in which this exchange was used for promptly summoning physicians and hospital attendants after a disastrous railroad wreck; this incident aroused a great deal of interest in the telephone at that time.

On Friday afternoon the meeting, which was opened at 2:30, was presided over by Vice-president Lockwood and was devoted entirely to addresses. Mr. Lockwood, with some felicitous remarks, introduced N. C. Kingsbury, vice-president of the American Telephone & Telegraph Company.

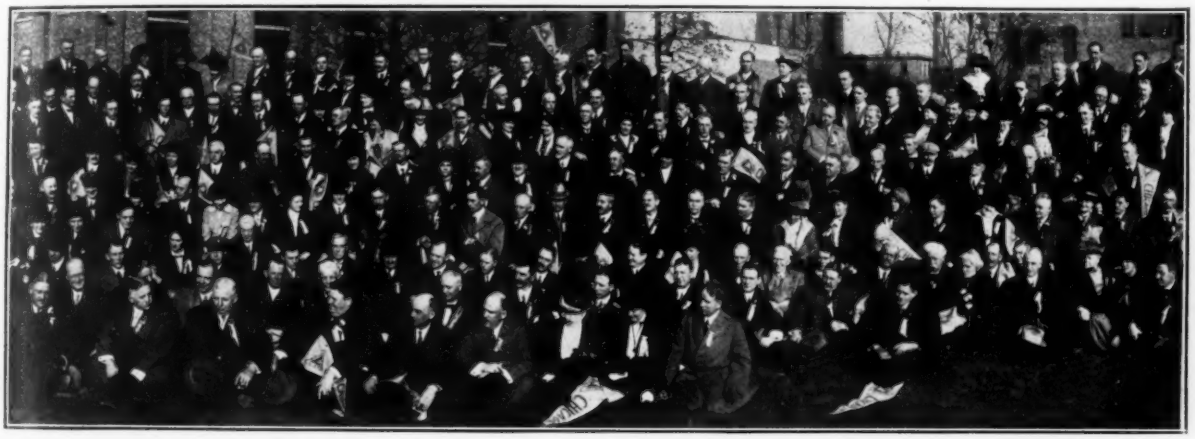
Telephone Problems of Today.

Mr. Kingsbury took as his subject the problems and hopes of the present and future. These problems are numerous and complex; one of the most important is the problem of financing the business. In the telephone industry the plant must be constantly enlarged and extended and capital must be secured for these extensions from time to time. It is an old saying that capital is timid, but it is also true that given a legitimate, stable business with assured earning power, capital readily seeks investment. The telephone business is perhaps one of the most stable of any line of business. Even during dark days of financial stress when other lines of business have either stopped growing or are going backward, the telephone business continues to increase in size and importance. Therefore, as long as there is a continuance of net earnings on a basis just to the public and at the same time safe and satisfactory to the investor the problem of financing will not be very difficult.

Ever since the invention of the telephone, hundreds of engineers have been busily engaged in researches and experiments that have resulted in the invention of hundreds of devices now used in the everyday operation of the telephone. The telephone art is continually advancing and the refinements achieved are creating a demand for further refinements. The success of the past calls for further achievements. But a few years ago it was the cause of great congratulation to be able to talk from New York to Philadelphia, or to Boston. Today if one cannot talk satisfactorily from New York to Chicago criticism of the telephone company is immediately heard. Engineering problems involved in achieving universal service are being worked out. The ability to talk from New York to Denver has aroused the desire to bridge the gap between Denver and the Pacific Coast. To permit talking from the Atlantic to the Pacific, clear across the continent, will have cost, in the opinion of Mr. Kingsbury, more of human effort, ingenuity, determination and money than it has cost to dig the Panama Canal. The time is at hand when aerial construction must be of such character as will withstand not only the usual but also to a great extent the unusual attacks of the elements.

Taking up the relations of the telephone business to the public, Mr. Kingsbury said that no problem at the present time is of greater importance. In his opinion the telephone business will in the future succeed or fail in proportion as we can educate, satisfy and please the public. Education is the first requisite, because the public really knows little about the business. The public is quick to realize that a great calamity, such as the recent Dayton flood, must seriously interrupt or for the time destroy the service, but the public knows little about the difficulties that cause slight deviation from the present high standard of service, which to the person not well acquainted with the difficulties connected with giving this service are apt to cause dissatisfaction and displeasure. The reason for doing things should be carefully explained. The telephone business is not a private business; in the fullest sense of the word it is a public business and the telephone companies have probably the largest public to serve of any business in the country. The public is a partner in the business and as such entitled to know exactly what is going on and the reasons for every line of action. By giving the greatest possible publicity the present unpopularity of the telephone with other public utilities will be done away with. There is particular need for developing relations of mutual confidence and respect between telephone companies and the public now, because of the general movement for investigation of every business in which the public is at all interested. The telephone business has nothing to conceal; it is a legitimate enterprise, conducted in accordance with all legal restrictions.

Regarding relations of the older companies with their competitors, Mr. Kingsbury said that the Bell system is not an enemy of any other. Unpleasant relations that at one time may have existed were the natural outcome of extra competitive effort, but government and state regulations have modified competition to a great extent and it is no longer necessary or wise to employ methods of warfare. The Bell system has no divine right



Right Half of Telephone Pioneers Group at Hawthorne Works of Western Electric Company, October 18, 1913.

to run the telephone business exclusively, but it does have some superior rights because it was the pioneer in the business and did the discouraging work of the pioneer; it has also developed the field along many lines greatly beyond the possibilities of any other interest and is in the best position to give the public universal telephone service of the highest grade. Therefore, an attitude of friendliness has been developed in regard to competitors consistent with the best policies of the public and with the effort to conserve to all investors as large a proportion of their investment as possible.

As to commission regulation, he said that the creation of commissions to serve as a connecting link between the corporations and the public is a fixed policy to which the companies must adapt themselves. They must convince the commissions that rates, practices and policies are just and equitable, or else change these so as to conform with the desires of the commissions. The Interstate Commerce Commission is at the present time making two investigations. One is of a general character to gather data and facts regarding the business of all telephone companies having an income of $50,000 a year or more. Another investigation just begun is the making of a detailed inventory of the physical property owned by all telephone companies in the United States. Although this will take many years, the facts ascertained will be of the utmost value. Despite the establishment of various commissions, the municipalities still desire to maintain some control over public utilities and here again it is necessary to truthfully represent the utility business as it actually exists. The Federal Government has instituted a suit based on the Sherman anti-trust law against the telephone interests in Oregon. In connection therewith every assistance will be given by the companies to the courts to determine whether the policy adopted is or has been inimical to public interest. If wrong has been done, it will be corrected.

Probably the most important telephone problem at present is that of giving the highest possible grade of service to the public. This is a problem of organization and involves devotion to duty not only on the part of operators but of every employee of the telephone company. They must all be taught that they are servants of the public and that the primary object of the telephone company is to give service. Mr. Kingsbury showed that this is the fundamental element in every feature of a telephone company's activities. Although every effort is being made to improve the equipment and the methods in order to give better service, still more will be required in the future.

Thomas B. Doolittle was then called upon to make an address. He dwelt on many features that had come to his personal attention in the early years of the telephone business. While engaged in the manufacturing business at Bridgeport, Conn., until 1876, he became interested in the telegraph, since many rush orders were received in that manner. With a number of friends he established a small local telegraph system controlled from a central switchboard and called it the Bridgeport Social Telegraph Association. It was connected between various residences, business houses, banks, etc. In June, 1877, he saw a number of telephones and brought some of them to Bridgeport, where he connected them to what until then had been the telegraph system. By a number of simple changes this was then converted into a telephone exchange. From this point his interest in the development of the telephone business became active to the point that he had to neglect other business. Later in that year he built what was the first private exchange, connecting the various departments and offices of the Ansonia Brass & Copper Company. Having already a knowledge of wire drawing, he used the facilities of this company for the production for the first time of hard-drawn copper wire. This wire was used in the private exchange of the company with very excellent results. Tests were made at various times and the wire was found to show no deterioration in conductivity or tensile strength. Mr. Doolittle made a number of attempts to introduce the wire for telephone lines but with rather indifferent success for several years. He narrated the changes that were made in the Bridgeport exchange; how he was compelled to give up its management and how, subsequently he worked on the development of a unit type of switchboard which was the forerunner of the multiple switchboard of the present day and of the multi-office system. He spoke of the difficulties in securing patents and of further improvements that he had made in the calling system. Subsequently he became interested in long- distance service until his retirement from active duty in 1909.

Mr. Lockwood then called upon Thomas A. Watson, who was so closely associated with Alexander Graham Bell in the invention of the telephone, to recite his recollections of this very important event. Mr. Watson gave a most fascinating narrative of his personal connection with the invention. His address was entitled:

The Birth and Babyhood of the Telephone.

Circumstances had compelled Mr. Watson to seek employment at an early age and in the early seventies he became an apprentice in the electrical workshop of Charles Williams, at 109 Court Street, Boston. Like other apprentices of the day he was engaged in a great variety of work and took keen interest in things both mechanical and electrical. The shop was not a very large one, employing 30 to 40 men, but aside from the shop of the Western Electric Company at Chicago was one of the best fitted shops in the country. The Western Electric shop, however, was able to turn out work of superlatively excellent workmanship. Many inventors came to Williams' shop to have apparatus built for testing out and developing their inventions and Mr. Watson had considerable to do with a number of these men, building a variety of appliances and also helping in testing the equipment. One of these was Alexander Graham Bell, for whom he constructed a number of coils for experiments through which Professor Bell was trying to develop the harmonic telegraph. Both transmitter and receiver consisted of an electromagnet with a flattened piece of steel clock spring clamped to one pole so that its free end was free to vibrate over the other pole. The transmitter had, besides this, a make-and-break mechanism which kept the spring vibrating in what Mr. Watson called a sort of nasal whine of a pitch corresponding to that of the spring. Professor Bell's idea was that when the signaling key was closed an electric copy of the whine could be passed through the wire and actuate that one of the distant receivers which was exactly tuned to correspond. Theoretically this harmonic telegraph seemed to be an extremely simple contrivance, but many experiments were made without any success.

While working with Professor Bell one day (June 2, 1875) Mr. Watson was at the transmitting end while Professor Bell was in another room some 60 feet away retuning the receiver springs; suddenly one of the transmitting springs stopped vibrating because its make-and-break points had become welded together. Presently Professor Bell rushed into the room demanding "What did you do then? Don't change anything! Let me see." It seemed that while the transmitter spring had stopped vibrating for its magnet, it had nevertheless been set to slight vibration by the sounds thereabout and Professor Bell had heard a faint reproduction of those sounds at the receiver near his ear. This gave him a clew for the development of a much simpler form of telephone than he had planned at one time to develop and he immediately started to work out the idea. That evening he had Mr. Watson mount a small drumhead of gold-beater's skin over one of the receivers, the center of the drumhead being joined to the free end of a receiver spring; a mouthpiece was placed over the drumhead. The next day the two men tried it out. As the two rooms formerly used were too near together for the test Mr. Watson ran a wire especially for the trial from one of the attic rooms down two flights of stairs to the third floor. Over this line the test was made that evening. Mr. Watson could hear Professor Bell's voice and almost catch his words but he could not make himself heard to Bell until they had changed their positions. This showed Bell that he was on the right track and he immediately set to work with Mr. Watson's aid in constructing a variety of forms of telephone. Various shapes of magnets and coils, diaphrams and mouthpieces were tried until in the following March such progress had been attained that Mr. Watson heard a complete and intelli-

gible sentence transmitted over the wire. Renewed experiments were then conducted and a telephone set was prepared for exhibition at the Philadelphia Centennial Exposition.

Mr. Watson said that on October 9, 1876, "we were ready to take the baby out of doors for the first time." Permission was obtained to use a private wire running from Boston to Cambridge, about two miles long, and that evening Mr. Watson was at Cambridge with one of the best telephones developed as yet, and Professor Bell signaled from the Boston office on a Morse sounder. At first nothing could be heard and it was found that a high-resistance telegraph relay was in the circuit; on cutting this out Mr. Watson clearly heard Bell call "Ahoy, ahoy." This was the first long-distance telephone conversation. Tests on longer telephone lines soon followed. The fame of the invention rapidly spread and a great many people made pilgrimages to Bell's laboratory to hear the telephone talk. In April, 1877, the first outdoor telephone line was run between Mr. Williams' office in Court Street and his home in Somerville.

Financial problems arose in the development of the invention which for the time were solved by Professor Bell giving a series of public lectures on the telephone. In these Mr. Watson was almost invariably the actor behind the scenes. Many amusing incidents in connection with these lectures were recounted by Mr. Watson, not the least of which was the difficulty experienced in trying to talk any distance over the telegraph lines then in use when a number of telegraph instruments were connected into the circuit without the knowledge of the lecturer and his assistant. Such an occurrence gave rise to a poem entitled "Waiting for Watson," which was published in a newspaper on the morning following a lecture that had turned out a dismal failure.

Mr. Watson continued with a narration of the many difficulties that arose with the attempts to develop signaling apparatus and other parts of equipment. He told how he had developed the magneto calling device and how he had started to work on switchboards. Other inventive minds were turned to the telephone. His own connection with the business ceased in 1881 when he was compelled to take a trip abroad on account of his health.

Entertainments.

A number of interesting entertainment features were provided for the Pioneers. Of these the first was a musical comedy produced at the Studebaker Theater by employees of the central group of Bell telephone companies. It was entitled "Telephonery" and was greatly enjoyed by the audience. After the play there were loud and repeated calls for the author but the blushing Angus Shrinking Hibbard declined to appear.

On Saturday the bulk of the day was devoted to an automobile inspection trip and tour of the park and boulevard system of Chicago. The first stop made was at the Bell Telephone Building, where guides took the visitors through a number of the operating rooms and departments. The works of the Western Electric Company at Hawthorne were then visited and here also guides took the Pioneers and their friends through the many departments. Luncheon was served in the large dining room of the Hawthorne Works and then followed a baseball game. A photograph of the inspection party taken about this time is reproduced herewith. The return trip was made through the South Side parks and boulevards, returning to the hotel late in the afternoon. Throughout this trip both the Western Electric Company's officials, headed by F. A. Ketcham, and the officials of the Chicago Telephone Company and the central group of Bell Companies, headed by Bernard E. Sunny, were most felicitous for the welfare and comfort of every member of the party. Every effort was made to make the trip pleasant and enjoyable.

The concluding event of the reunion was the annual banquet given in the Gold Room of the hotel on Saturday evening. This was enlivened by musical and other entertaining features. The dinner was given by the American Telephone & Telegraph Company. A unique souvenir was provided for each guest; this was a candle-holder made of a standard telephone receiver on top of which is a candle clamp.

A special train was provided by the Pennsylvania Railroad to bring about 60 Pioneers from New York. This arrived in plenty of time for the opening of the meeting and a similar special train took many of the Pioneers back to New York. President Vail came in his private car with Mr. and Mrs. U. N. Bethell, Mr. and Mrs. H. B. Thayer and Mr. and Mrs. N. C. Kingsbury. An interesting souvenir of the convention was a beautiful gilt badge with a miniature telephone set that was provided for each Pioneer.

Space permits mentioning but a few of the Pioneers that were present at the third reunion. Among those were Mr. and Mrs. W. R. Abbott, Chicago; Mr. E. B. Baker, Minneapolis; Mr. and Mrs. E. M. Barton, Chicago; Mr and Mrs. W. E. Bell, Chicago; Mr. F. H. Bethell, New York; Mr. and Mrs. U. N. Bethell, New York; Mr. and Mrs. C. L. Boyce, Detroit; Mr. and Mrs. C. H. Brownell, Peru, Ind.; Mr. Alonzo Burt, Chicago; Mr. and Mrs. J. E. Culbertson, Cincinnati; Mr. C. B. Doolittle, New Haven; Mr. Thos. B. Doolittle, Branford; Mr. and Mrs. E. B. Field, Mr. and Mrs. E. B. Field, Jr., Denver; Mr. J. J. Ghegan, New York; Mr. and Mrs, Angus S. Hibbard, New York; Mr. H. F. Hill, Chicago; Mr. W. J. Hiss, St. Louis; Mr. and Mrs. Leland Hume, Nashville; Mr. and Mrs. C. A. Janke, Camden, N. J.; Mr. and Mrs. N. C. Kingsbury, New York; Mr. C. J. Leslie, Toronto; Mr. A. G. F. Lockwood and Mr. Thomas D. Lockwood, Boston; Mr. R. T. McComas, Cincinnati; Mr. and Mrs. C. W. McDaniel, Kansas City; Mr. G. T. Manson, New York; Mr. F. C. Mason, Grand Rapids; Mr. and Mrs. H. J. Pettingill, St. Louis; Mr. H. W. Pope, New York; Mr Charles W. Price, New York; Mr. and Mrs. A. L. Salt, New York; Mr. J. A. Seeley, New York; Mr. H. O. Seymour, Milwaukee; Mr. W. A. Sherwood, Mt. Vernon, N. Y.; Mr. and Mrs. B. E. Sunny, Chicago; Mr. and Mrs. H. B. Thayer, New York; Mr. H. F. Thurber, New York; Mr. Theodore N. Vail, New York; Mr. T. A. Watson, New York; Mr. W. T. Westbrook and Mr. W. T. Westbrook, Jr., Philadelphia; Mr. C. H. Wilson, New York; Mr. Robert Yearsley, Chicago.

Jovian Meeting in Chicago.

At the regular weekly meeting of the Jovian Lunch Club of Chicago, on October 21, E. H. Waddington gave a brief outline of the work done at the national convention held in New York. He stated that Homer E. Niesz of Chicago had agreed to accept the appointment of Statesman for Chicago, and the club thereupon passed a resolution endorsing Mr. Niesz for the position and also suggesting the appointment of Mr. Waddington as alternate statesman.

George C. Richards, retiring statesman, spoke of the small attendance at Jovian meetings since the day of meeting had been changed and suggested that a postal-card vote be taken for a meeting day that meets with general approval.

Chicago Electric Club.

In the course of an address delivered before the Electric Club of Chicago on October 16, Capt. J. J. Healy, of the Chicago Police Department, presented some interesting statistics on traffic congestion in the business district. For instance, in the so-called loop district, which comprises but 58 square blocks, there are street-car lines located on 15 streets. Over 3,100 street cars traverse this district each day, while the vehicle traffic aggregates 130,000 wagons and automobiles each day. The elevated lines handle 300,000 passengers in the loop district daily. The two companies operating surface cars handle an aggregate of 116,000,000 passengers in the course of a year.

The regulation of this enormous traffic is one of the serious problems of the city and Captain Healy asked for the co-operation and assistance of the members of the Electric Club, particularly in the strict observance of the traffic rules.

Dr. Charles P. Steinmetz has agreed to address the club on October 30.

Association of Railway Electrical Engineers.

The sixth annual convention of the Association of Railway Electrical Engineers was held at the Hotel La Salle, Chicago, October 20 to 24, with an attendance far in excess of any previous convention. The exhibits of members of the Manufacturers' Association also exceeded in number and character the displays maintained at any previous meeting. The entire nineteenth floor of the Hotel La Salle was occupied by exhibits.

The convention was opened on Monday night with an informal reception and dance held in the East Room of the hotel. The first business session was called to order by President D. J. Cartwright on Tuesday morning, promptly at 10 o'clock. In opening the meeting, Mr. Cartwright called attention to the character of the papers and reports that were to be presented, and also urged members to take advantage of the displays made by the manufacturers of apparatus. The report of the secretary-treasurer was then presented by Joseph A. Andreucetti, the present incumbent, which showed the finances of the Association to be in a sound condition and the membership in excess of any previous year. A net gain of eighty-one new members of various classes was made during the present administration.

Amendments to the constitution dealing principally with classification of membership and dues were then acted upon separately, and each was approved.

Following this, the report of the Committee on Standard Reports for Operation, was presented by F. E. Hutchinson, chairman. This report points out that as the number of electrically lighted cars increase on larger roads, the handling, checking and filing of reports becomes cumbersome and inefficient, mostly on account of the fact that the proper checking of these reports can only be made by a person who is thoroughly versed in the operating details of electric lighted cars, as well as the mechanical and electrical details of various equipments. It is recommended that reports be made in books bound to contain 100 to 150 sheets, of which each alternate sheet shall be original and copy. When the leaves of this book become exhausted, the book containing the original reports in date order will be returned to the electrical engineer's office as a permanent record. Tentative forms of pages for this book were presented in the report.

The report was briefly discussed by J. J. Hack, J. A. Andreucetti, and President Cartwright. It was the concensus of opinion that the loose-leaf system for keeping car reports was advisable although no check could be made on cars not reported.

At the afternoon session, the report of the Committee on Head-End Equipment was presented by the secretary. This report presents a series of notes dealing with the practice obtaining on the various trunk lines using the head-end system for electric train lighting. Numerous wiring diagrams are shown. The committee recommends that owing to the numerous methods of wiring and installing head-end systems in dyanmo cars, a standard system should be adopted.

Following this report, the report of the Committee on Electric Head Lights was presented. A detailed report of this and succeeding sessions will be published in our next issue.

A feature of the convention was the informal dinner on Tuesday evening given by the Electric Storage Battery Company. At this dinner J. Lester Woodbridge, chief engineer of the company, described the E. S. B. axle-lighting system for railway cars. This system possesses many unique features, and the presentation by Mr. Woodbridge was received with great enthusiasm. A lively discussion of the technical features of the apparatus added greatly to the interest. After the dinner and discussion Mr. Woodbridge explained in greater detail the operation of the device, using the complete outfit which was on exhibition at the convention. The system will be described and illustrated in an early issue. The dinner and meeting were ably handled by Godfrey H. Atkin, Chicago manager of the Electric Storage Battery Company.

Electrical Census Figures for 1909.

Statistics of the electrical machinery, apparatus and supplies industry in the United States for 1909 are presented in detail in a bulletin soon to be issued by the Bureau of the Census. It was prepared under the supervision of W. M. Steuart. This industry includes the manufacture of the machines and appliances used in the generation, transmission and utilization of electric energy, together with most of the parts accessories and supplies for them. It does not include, however, the production of poles, whether of wood, iron or steel; nor does it include the manufacture of glass and porcelain ware made expressly for electrical purposes, that of bare iron and copper wire, or any of the group of electrochemical and electrometallurgical products.

The total number of establishments in the United States in 1909 engaged in the manufacture of electrical machinery, apparatus and supplies was 1,009. The total number of persons engaged in the industry was 105,600, of whom 102,950 were wage earners. The total capital employed was $267,844,432, and the total value of products was $221,308,563.

In 1909 there were 16,791 generators of all kinds manufactured, of a total value of $13,081,048. Of these, 13,882 were direct-current and 2,909 alternating-current. During the decade ending with 1909 there was an increase of 59.5 per cent in the number, and of 143.2 per cent in the total capacity of generators produced. The average capacity per machine increased from 55 kilowatts in 1899 to 84 kilowatts in 1909.

There were 76,729 transformers manufactured, of a total value of $8,801,019.

The production of switchboards in 1909 was valued at $5,971,804.

504,030 motors of a total horsepower of 2,733,418 and a value of $32,087,482 were manufactured in 1909. The number, capacity and value of motors were very much larger in 1909 than in 1899. The number of motors of all kinds produced increased 215.5 per cent during the decade, their capacity 123.8 per cent, and their value 64.5 per cent. The largest increases are shown in the case of motors for operating stationary machinery.

The general report on manufactures shows a large increase in the use of electric power. In 1909 there were 388,854 electric motors with a capacity of 4,817,140 horsepower installed in manufacturing establishments. In 1899 there were only 16,891 motors reported, with a capacity of 492,936 horsepower.

The number of primary batteries manufactured in 1909 was 34,333,531, valued at $5,312,595; an increase in value of 498.7 per cent since 1899. The production of batteries was valued at $4,243,984 for 1909, an increase of 65.8 per cent during the decade.

The value of arc lamps manufactured in 1909 was $1,706,959, and the number 123,985. From 1899 to 1909 there was a decrease of 34,202, or 21.6 per cent, in the number of arc lamps manufactured and a decrease of $120,812, or 6.6 per cent, in their total value. The decrease is accounted for by the fact that, while formerly arc lamps were used almost exclusively for street lighting and other purposes, incandescent lamps have now replaced them to a considerable extent.

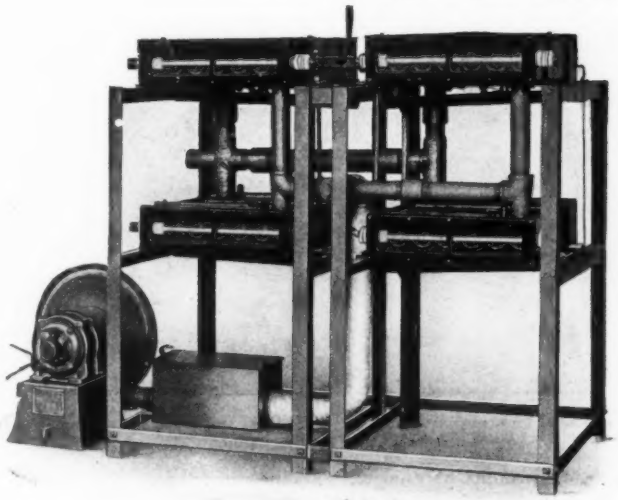
The production of incandescent lamps showed a valuation of $15,714,809 for 1909 and a total number of 66,776,997. About one-fifth of this total production was tungsten, the remainder being classified as carbon filament.

The value of insulated wire and cables manufactured in 1909, 1904 and 1899 constituted the largest single item in the total value of electrical machinery, apparatus and supplies reported, representing more than one-fifth of the total value of products for the industry at each census. Of the $51,624,737 reported as the total value of insulated wire and cables, $40,250,752 was reported by establishments in the industry proper, and $11,374,165 by establishments engaged primarily in other industries.

New Electrical and Mechanical Appliances

Sprague Industrial Ozonators.

The uses of ozone are gradually being better appreciated and the demand for ozonators is consequently increasing. Although ozonators have been used perhaps most extensively for ozonizing air as an adjunct to ventilating, they are now being used somewhat extensively in various industrial establishments as features in the manufacturing processes. Many processes for which ozone is being industrially employed are bleaching cloth, straw, wool and flour; hardening, clarifying and deodorizing paint, varnish, oil and wax; for sterilization of beer barrels and vats; for aging liquors, etc. They also are being used to some extent for the purification of water supplies.



Sprague Industrial Ozonator with Air Filter and Blower.

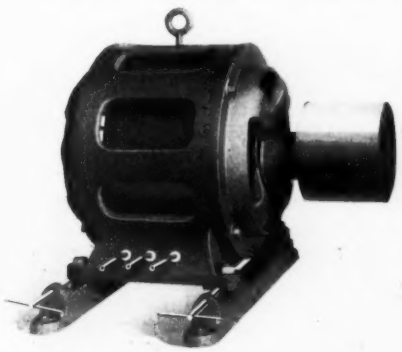
Ozonators intended for industrial work must meet different requirements from those used in connection with ventilating equipments. For this purpose the Sprague Electric Works of the General Electric Company, New York, N. Y., has developed and placed upon the market a line of industrial ozonators of efficient design and rugged construction. One of these sets is shown in the accompanying illustration, which is a double two-unit ozonator with air filter and blower. The ozonator units are cast-iron boxes provided with electrode tubes between which a high-tension discharge takes place, the air being passed between the inner enamel-steel tubing and the outer glass tube and thus ozonized is carried by means of piping to any desired point of application. The ozone units are supported on a structural steel framework, two units being mounted on each frame.

In the illustration shown there is also provided an air filter at the base of one of the frames; this is a sheet-steel box, in which the air is passed over a layer of calcium chloride by means of which moisture is removed. The air then passes through a fine screen and a layer of cotton waste, by which all dirt and dust are removed. The motor-driven centrifugal blower, shown at the left, provides a forced current of air, which, after passing the filter and ozone units, can be carried to some distance and against considerable pressure. A control panel (not shown) is conveniently mounted on one side of the supporting framework and is equipped with voltmeter, switches and regulating devices for changing the transformer voltage. Similar equipments of larger and smaller size, some including a step-up transformer, are also made to suit individual requirements.

Lincoln Squirrel-Cage Motors.

A type of squirrel-cage induction motors with many interesting features has been placed on the market by the Lincoln Electric Company, Cleveland, O. These motors have been designed so as to produce a high torque, making them very satisfactory for elevator and hoist service. Their special design permits these motors to deliver a certain starting torque at from 5 to 25 per cent less starting current than would be the case with the same size of slip-ring motor. From the same weight of iron and copper the manufacturers claim they attain from 20 to 40 per cent more torque than is the case with a slip-ring motor. The machines also deliver twice their full-load torque with not to exceed twice full-load current. Thus, in elevator service, the installation problem is greatly simplified, since a machine of this type with a reversing switch can be installed at a cost of 25 to 50 per cent of the cost of a slip-ring motor of equal rating together with its controller; moreover, the squirrel-cage motor will do the same work with less current consumption and elimination of repair trouble.

The stator of these motors is made up of duplicate laminations assembled in a cast frame and put under a high hydraulic pressure and keyed securely in place. The imposition of this high pressure on the laminations eliminates the possibility of their vibration and thereby eliminates practically all noise when the machine is in operation. Therefore the disagreeable howl and humming usually attendant upon starting and running of similar motors is said to be entirely done away with. The stator slots are semi-inclosed, the insulation being put in the slot itself and the coils being form wound.



Lincoln Squirrel-Cage Induction Motor.

After the machine is completely wound, it is subjected to a special im-

pregnating process which fills up the gaps in the winding and insulation with a special oil and waterproof varnish.

The rotors have conducting rods which are short-circuited by a formed ring that is forced onto the ends of the rods under heavy hydraulic pressure. This process forms a joint which remains perfect under all conditions of heating or wear.

Toledo Railways Adopts Improved Lighting for Its Street Cars.

The illumination of street-railway cars is one of the important problems to which the enterprising management of the modern public utility is giving serious attention. With the introduction of the tantalum lamp street-railway men saw the possibilities of greatly improving the illumination of the interior of their cars, and it is a fact that where the company has made proper use of the more efficient units of illumination as they have been developed the riding habit has been actually increased, due to the more attractive appearance of the cars and the greater degree of comfort secured by the riders

The development of the highly efficient Mazda type of lamp has given the street-railway operator another agency with which to cope with the increasing demands of the patrons of street railways, adding to their comfort without increasing to too great a degree the cost to the organization of securing the improved equipment. The next step in advance has been with relation to securing the most convenient wiring diagram in connection with the selection of the best adapted type of lamp and reflector.

The illuminating engineering department of the Bryan-Marsh Electric Works of the General Electric Company, Chicago, has taken a prominent position in adapting the right type of tungsten lamp, equipped with the proper reflector, to the illumination of plants devoted to industrial applications of every description. Quite recently this department turned its attention to the devising of a scheme of illumination which would best suit the requirements of the modern electric street-railway car. Since the purchase of the Toledo Railways & Light Company's property by H. L. Doherty & Company, a complete system of tests has been inaugurated to determine what would best suit the requirements of satisfactory and economical illumination. Under the direction of J. A. Munroe, manager of the illuminating engineering department of the Bryan-Marsh Electric Works, and Mr. Brown, master mechanic for the Toledo Railways & Light Company, illumination test runs were made to determine the intensity and uniformity of illumination given by the several different makes of reflectors submitted for selection for installation in the company's cars. The inside dimensions of the cars were 34 feet, six inches, by seven feet, eight inches. Twelve test stations were established, a Sharpe-Millar No. 164 portable photometer being used. The standard lamp was a battery lamp operated on a storage battery and maintained at its proper voltage by means of a rheostat and No. 880 Weston voltmeter. A tripod was provided for the illuminometer, each reading being taken at a point 34 inches above the floor. Tests were made under actual operating conditions, no voltage corrections being made. The reading of the photometer was done by Douglas Wood, of the Bryan-Marsh Electric Works, assisted by H. W. Shalling, of the Holophane Works of the General Electric Company.

Interior of Toledo Street Car, Showing Excellent Illumination Produced by New Standard Lighting Equipment.

A fixture of special design made for street-car service by the Safety Car Heating & Lighting Company was used. This fixture affords a sure grip, adequate cushion against jar, is of compact construction, free from separable parts, and quick in its adaptation to service. In all, seven tests were made.

In test No. 1, the car was equipped with fifteen 36-watt Mazda lamps with Holophane Realite No. 2073 sand-blasted reflectors. The lamps were arranged seven along each side of the car, with one lamp near the rear vestibule. The average foot-candles in this test were 3.6.

In test No. 2, the car was equipped with the same number and same arrangement of 36-watt Mazda lamps, with six-inch No. 01213 Holophane Sudan reflectors. In this case the average foot-candles were 4.17.

In test No. 3, the car was equipped with five 94-watt Mazda lamps in No. 0390 Holophane pearl-finished Sundan reflectors. The lamps were placed in the ceiling along the center line of the car. In this case the average foot-candles were 3.7.

In test No. 4, the car was equipped with fifteen 54-watt clear carbon lamps without reflectors. In this case the average foot-candles were 1.5.

In test No. 5, the car was equipped with five 94-watt Mazda lamps with No. 7507 sand-blasted Holophane Realite reflectors. The average foot-candles were 4.24.

In test No. 6, the car was equipped with five No. 0389, 12-inch Veluria semi-indirect fixtures, each containing one 94-watt Mazda lamp. In this case the average foot-candles were 3.3.

In test No. 7, the car was equipped with fifteen 23-watt Mazda lamps without reflectors. In this case the average foot-candles were 11.3.

The arrangement using 36-watt Mazda lamps in Holophane Sudan glass reflectors, mounted in the Safety Car Heating & Lighting Company's No. 9828 fixture, as exemplified in test No. 2, because of its economy in wiring, ease of installation, efficiency of current consumption, was recommended. Based upon this recommendation, 70 cars have now been equipped and the system will be applied to 250 cars.

Current Electrical News

LIGHTING AND POWER.

(Special Correspondence.)

CORRECTIONVILLE, IOWA.—The electric light plant will be rebuilt. C.

RICEVILLE, IOWA.—Business men have raised money for electroliers on Main Street. C.

NEW MEADOWS, IDAHO.—The Adams County Light & Power Company has been incorporated here.

ROCK FALLS, ILL.—The Council is considering plans for an electric light plant. Address the city clerk.

AUBURN, NEB.—$17,000 will be expended to establish a light and water system here. Address the city clerk.

IDA GROVE, IOWA.—An ornamental lighting system will be installed on the business streets at a cost of $3,000. C.

MARSHFIELD, ORE.—The City Council has awarded a five-year contract for street lighting to the Oregon Power Company.

HIBBING, MINN.—The electric light plant is overworked. Enlargements are necessary. Address the superintendent.

BAKER CITY, ORE.—The City Council has advertised for bids for the installation of machinery and equipment in the new municipal power plant.

SANTA ANA, CAL.—The Supervisors are advertising for bids for lighting the recently organized Placentia Lighting District in this county.

KALAMAZOO, MICH.—The Council will place 208 ornamental lamp standards. Address City Engineer Lenderink for desired information.

FERGUS FALLS, MINN.—The Otter Tail Power Company is arranging to extend its electric lines westward from Wahpeton to Fairmount, N. D.

HONEY CREEK, WIS.—Over $2,000 has been subscribed for an electric light plant for this village. Write the President of the Village Council.

WENTON, KY.—W. English Arnold has secured a franchise and will construct an electric light plant. It will be operated in connection with his flour mill. G.

GRETNA, NEB.—A franchise for light and power has been granted to the Omaha & Lincoln Railway Company. A transmission line will be built from Papillian. C.

WILKESBARRE, PA.—Architect W. H. Bodine, of Philadelphia, Pa., is preparing plans for a large electric power plant to be erected here at a cost of $75,000.

PORTLAND, ORE.—The Portland Railway, Light & Power Company has been awarded a three-year contract for the lighting of the city with arc and incandescent lamps.

ANTIGO, WIS.—An ornamental lighting system will be installed for Fifth Avenue and other streets. Address Manager Becker, of the Antigo Electric Company.

SALEM, ORE.—The Salem Commercial Club, of which P. H. D'Arcy is president, is agitating the proposition of installing a cluster-lighting system on Commercial Street. O.

SAN JOSE, CAL.—The Inyo-Cerro Gordo Mining & Power Company of this place has secured a permit for the erection of a power plant on Lone Pine Creek in Inyo County.

NEW BRITAIN, CONN.—D. McMillan is considering the installation of an electric generating plant to furnish energy for the lamps and motors of his building on Main Street.

OTTAWA, ONT.—The Valley Field Water Power Company has filed articles of incorporation, naming the capital stock at $1,000,000. The head office will be at Salaberry, Quebec.

DORCHESTER, NEB.—Engineer C. O. Martz, Lincoln, Neb., is preparing plans for an electric light plant for this place. Bids will be called for in December. W. W. Wall is city clerk.

LITTLE FALLS, MINN.—All the arc lamps furnished by Little Falls Water Power Company will be replaced by 100-watt tungsten lamps. Victor Schallern is city clerk.

HAMILTON, WASH.—The Pacific Northwest Traction Company, a subsidiary of the Stone & Webster Corporation, will immediately construct transmission lines into this city and Lyman. O.

KIRKLAND, WASH.—The Puget Sound Traction, Light & Power Company will extend its light and power lines from this city to Bellevue shortly, according to advices received from the Seattle offices. O.

MILWAUKEE, WIS.—Electric service companies will be asked by the Common Council to submit bids for furnishing the city with electric lighting for a five or a ten-year term. Address the city clerk.

CORVALLIS, ORE.—A committee appointed by the City Council to investigate the proposition of lighting this city with current furnished by the Oregon Power Company recently reported in favor of the proposition. O.

NORWALK, O.—H. Whitford Jones, of Cleveland, employed by the Council several months ago as an expert, has submitted a report showing that a complete municipal electrical lighting plant and system can be built for $103,188.

SAN FRANCISCO, CAL.—The Napa Valley Electric Company has applied to the California Railroad Commission for authority to issue $20,500 in bonds and $6,500 in stock. The proceeds of the bonds will be used for betterments and extensions.

CHEBOYGAN, MICH.—The Cheboygan Electric Light & Power Company has made application to the State Railroad Commission for permission to issue $250,000 in bonds. Improvements will be made. Address John R. McArthur, president of the company.

SEATTLE, WASH.—The Puget Sound Traction, Light & Power Company recently purchased Cupples Farm, on the Baker River, on which a power plant will be built in the immediate future. For information, address the local offices, Pioneer Building, Jacob Furth, president. O.

HIGHLAND PARK, MICH.—A system of ornamental street lighting, using a five-lamp cluster standard will be installed on Woodward Avenue for a length of two miles. The wiring will be underground. It is in charge of L. D. Beckley, superintendent of public works, 28 Gerald Avenue.

KLAMATH FALLS, ORE.—M. C. Donahue, president of the Pringle Falls Electric Power & Water Company, will build a new power station six miles west of here. A small sawmill will be erected first, and then a small power plant to operate the sawmill will be built while the larger power plant is being installed. O.

LOUISVILLE, KY.—The Falls City Construction Company has the contract for the construction of an electric light and power plant in connection with the Grayson Springs (Ky.) Hotel Company's new building. The cost of the mechanical equipment will be about $50,000. Plans for the plant will be ready in about six weeks. G.

ISSAQUAH, WASH.—The City of Issaquah will shortly receive bids for furnishing lights for the coming year. The concern to whom the contract will be awarded will be required to furnish tungsten lamps instead of the old carbon lamp now in use. Councilmen Day, Newkirchem, and Coots constitute the Committee which will handle this matter. O.

MENOMONEE FALLS, WIS.—J. A. Pratt, of this city, and William C. Leitzke, Wausau, have purchased the plant of the Menomonee Falls Light & Power Company, which will be known as the Menomonee Falls Electric Light & Power Company. A new power plant system will be installed and power will be furnished to surrounding towns and villages.

CASHMERE, WASH.—Ne Page, McKenna & Company, of Seattle, who recently secured the contract for the installation of a street-lighting system here, will begin work immediately under the direction of James Fisher. The contract calls for the installation of 121 lamps in the business and residence districts. Additional machinery will be installed in the substation. O.

CENTRALIA, WASH.—The Washington Public Service Corporation,

which is developing the Big Water Falls at White Salmon, has applied to the Lewis County Commissioners for a franchise to string light and power transmission lines from Chehalis to Centralia, and from Centralia to the North County line, towards Olympia. It is understood that the Commissioners will grant a conditional franchise.

NORTH PLATTE, NEB.—Willis Todd and John W. Parish, of Omaha, representing Omaha and eastern people, are arranging the preliminary work of building a large hydroelectric power plant on the Birdwood Creek and transmission lines to supply electricity to Sutherland, Hershey, North Platte and other nearby towns; also to the Union Pacific Railway and a number of irrigation pumping plants in the Platte Valley.

SACRAMENTO, CAL.—F. G. Eby, S. H. Whisner, L. F. Breuner and others of this city have filed an appropriation upon the waters of Feather and Fall Rivers in the Sierra Nevada Mountains above Oroville. The appropriation papers state that about 60,000 horsepower of electric energy will be developed at a cost of approximately $360,000. The plans of the syndicate include the building of a dam capable of impounding 15,000,000 cubic feet of water.

SAN FRANCISCO, CAL.—Word has reached here from Washington that the Secretary of Agriculture has granted to the Truckee River General Electric Company a permit to develop electric power in the El Dorado National Forest in Northern California. The developments planned by the company include the construction of seven reservoirs, the boring of a tunnel approximately a mile and a half long and the building of two power plants with a head of about 1,300 feet in each case. The initial installation will generate 16,000 horsepower.

DEERFIELD, MASS.—A deed has been recorded of the transfer of the French King Rapids Power Company to the Turners Falls Company. The property transferred increases very greatly the holdings of the latter company, and places in its hands the means for still greater power development. A charter has been secured by the French King Company for the erection of a dam for power development purposes at the French King Rapids in the Connecticut River, and the plans which have been made by this company will probably be followed out by the Turners Falls Company.

LAGRANGE, IND.—Henry J. Platt, Lyman G. Young, Loara M. Rowe, Charles A. Zook, Valentine D. Weaver, Dr. Pardon D. Ballou and Gunther C. Nichols, of Lagrange, and George F., F. D. and C. J. Avis, of Hudson, Mich., are the stockholders in a company which has succeeded the Lagrange Electric Company, owned by George F. Avis, and for which articles of incorporation have been filed. $75,000 is the capital stock of the new company. All electric light and power property in Lagrange county owned by the old company is turned over to the new. It is also the purpose of the new company to extend transmission lines to Wolcottville, Rome City and other points in and out of Lagrange county, also to build lines and construction work in the above mentioned towns for street lighting systems, also for commercial lights and power to furnish lighting and power at Valentine and along the transmission lines to farm residences.

TELEPHONE AND TELEGRAPH.

(Special Correspondence.)

DAVENPORT, WASH.—John Hansen will build a telephone line from Greenwood to Spokane this fall.

GIRARD, ILL.—The Girard Telephone Company has been incorporated with a capital stock of $50,000 by C. B. Cheadle, L. M. Shaw and others.

VINSON, OKLA.—The Vinson Telephone Company has been incorporated with a capital stock of $7,600 by J. N. Burlseon, H. T. Baxter, and others.

ANAMOSA, IOWA.—The Iowa Telephone Company will soon place its cables underground. Address J. F. VonVors, of Cedar Rapids, for particulars.

WALLACE, IDAHO.—The Pacific States Telephone Company will immediately make improvements, extensions, etc., in this city, costing about $1,000. O.

SARIES, N. D.—Smith Telephone Company has been incorporated with a capital stock of $25,000 by Henry Ambie, H. D. Lee and W. H. Smith, all of Saries.

GILLESPIE, ILL.—The Gillespie Home Telephone Company, has been incorporated with a capital stock of $60,000 by T. A. Cheadle, L. M. Shaw and others.

BLOOMFIELD, MO.—The Stoddard County Telephone Company has been incorporated with a capital stock of 1,000 by L. A. Hobbs, William Goddard and others.

MAXBASS, N. D.—Farmers' Telephone Company has been incorporated with a capital stock of $25,000 by A. V. Stout, F. W. Rothert and Joseph Watson, all of Maxbass.

WHITESBURG, KY.—The Whitesburg Telephone Company will start immediately the construction of a local and long-distance telephone line from Whitesburg to Hazard.

RACINE, WIS.—The Council is considering the matter of placing the telegraph and electric lights wires underground. Address City Engineer Connolly for information.

HAWKINSVILLE, GA.—J. T. King and John T. Allen, of Milledgeville, and W. A. Jennings, of Jessup, have purchased the Hawkinsville Telephone Company and will improve the system.

ANACORTES, WASH.—The Independent Telephone Company, of which J. W. Winslow is general manager, will immediately make extensive improvements to the local telephone system. O.

SEARCY, ARK.—The Searcy Telephone Company will be organized here to be owned entirely by local capital and operated under a 25-year franchise. Address the city clerk in regard to plans, etc.

PEORIA, ILL.—The Central Union Telephone Company is planning to extend its lines in this city. The work will involve an expenditure of nearly $85,000, and will require thirty million feet of cable wire.

LEWISTON, IDAHO.—Articles of incorporation have been filed by the Big Potlatch Mutual Telephone Company. The incorporators are Joseph Schultz, John Berryman, A. H. Blum, A. N. Entmann and Herman Lohman, who will build a telephone line.

ELECTRIC RAILWAYS.

(Special Correspondence.)

BAKERSFIELD, CAL.—A new car line is planned for Bakersfield. Address Joseph Cuda, president, for particulars.

VISALIA, CAL.—The City Council will receive bids until November 1 for a 50-year electric railway franchise in this city.

MUSCATINE, IOWA.—The Davenport & Muscatine Railway Company will build extensive improvements to its line. Address P. P. Crafts, general manager, for information.

THE DALLES, ORE.—Cornelius Gardner of this place has purchased a right of way for an electic railway between Ortley and Rowena, and will put in a line at a cost of about $25,000.

HELENA, MONT.—The Commercial Club has taken up the proposition of John D. Ryan to contribute $50,000 for an electric line to Prickly Pear Valley.

LEWISTOWN, MONT.—It is reported that an electric railway will be built from here to Great Falls and that the promoters are now in Europe raising money for the project. K. Matthews is interested.

CLARK, W. VA.—The Elkhorn Valley Traction Company has been granted a franchise to construct a five-mile electric railway through Clark and Keystone. L. E. Tierney is president of the company.

CHATTANOOGA, TENN.—A company has been formed here to build a traction line to Cleveland, Tenn. A tunnel has just been completed by the county through Missionary Ridge, near Chattanooga, and this will be used to avoid expensive construction work.

RANTOUL, ILL.—The Kankakee & Urbana Traction Company will extend its line northward from Rantoul to Ludlow. The present substation at Thomasboro will suffice to furnish power for the extra six miles, and cars can be run at about the same intervals as at present with no additional expense.

TECUMSEH, OKLA.—The Rapid Transit Interurban Company has been incorporated to build a road from Muskogee by the way of Tecumseh and Chickasha with an intermediate branch from Tecumseh to Guthrie and an intermediate branch from Tecumseh to Sulphur. A. B. Coryell will have charge of construction.

MOSCOW, IDAHO.—With a view of urging the Spokane & Inland Electric Railway Company to extend its line to Colton and Uniontown, Moscow citizens are active in preparing data to that end, and James J. Keane, a resident of Moscow, is circulating a petition which will be presented to the railroad company. O.

DETROIT, MICH.—Plans for a new interurban line between Grand Rapids and Detroit, which will be constructed at a cost of $6,000,000 have been completed. Andrew Fife, former collector of customs at Detroit, and associates from Pittsburgh, Cincinnati and New York have purchased the right of way of the Detroit, Lansing & Grand Rapids Railway Company and the work of building the line will be started early in the spring of 1914. The line will be 175 miles long and will pass through 25 important cities and towns. The company now holds franchises from 14 cities and 52 townships.

NEW INCORPORATIONS.

SPOKANE, WASH.—Gage Electric Company has been incorporated with a capitalization of $50,000 by George J. Gage and Hubert P. Suing.

CHICAGO, ILL.—Northwestern Electric Castings Company has been incorporated with a capital stock of $10,000 by Herschel V. Shepard, Howard W. Lewis and William T. Church.

LOS ANGELES, CAL.—The Pacific Electric Construction Company has been incorporated here with a capital stock of $10,000 by A. M. Johnson, Isabelle Johnson, N. R. Smith and R. G. Yocum.

ST. LOUIS, MO.—Missouri Electrical Company has been incorporated with a capital stock of $2,000 to do a general electrical business. The incorporators are Lester J. Harris, G. L. Gamp and Arthur C. Eckert.

BRIDGEPORT, CONN.—The Aurora Vulcan Company has been incorporated with a capital stock of $250,000 to deal in spark plugs and similar accessories. The incorporators are S. Sherwood Day, H. Billings and R. K. Hall. W.

CLEVELAND, O.—The Multi-Lux Illuminating Company has been incorporated with a capital stock of $25,000 to deal in electric lighting fixtures. The incorporators are E. M. Smith, N. W. Kackley, H. S. Haim, Ira O. France and W. H. C. Towler.

ST. LOUIS, MO.—General Storage Battery Company has been incorporated with a capital stock of $2,000 to manufacture, buy, sell and deal in and repair storage batteries, etc. The incorporators are Joseph Desloge, Firmin and Louis Desloge.

LOUISVILLE, KY.—The Keeler Company has been organized for the purpose of dealing in storage batteries. Special attention will be given to the automobile business. The company has $400 capital stock, George G. and E. C. Keeler being the principals. G.

ST. LOUIS, MO.—The St. Louis Storage Battery Company has been incorporated with a capital stock of $2,000 to buy, sell, manufacture and deal in storage batteries, electrical and mechanical devices, etc. The incorporators named are Joseph Desloge, Firmin and Louis Desloge.

PITTSBURGH, PA.—Application for a Pennsylvania State charter will be made by George L. Kopp, Jacob C. Platz, Herman Schutte, T. R. Evans and Louis Shuman for the incorporation of the Schutte Electric Company to deal in electrical apparatus and supplies.

NEW YORK, N. Y.—The Roffy-Grace Corporation has been granted articles of incorporation to deal in lamps, fixtures for lighting, heating, power or motion. The incorporators named are Sergius P. Grace, Joseph T. Roffy and Sarah K. Singer, all of New York City.

NEW YORK, N. Y.—Ak-Ray Corporation has been granted articles of incorporation to deal in lamps and fixtures for electricity, etc. The capital stock is $100,000 and the incorporators are Sergius P. Grace, Joseph T. Roffy and Sarah K. Singer, all of New York City.

ABERDEEN, S. D.—The Lennox Milling Company has been incorporated to manufacture four and electricity and to supply electric current in Lincoln County over a power line 25 miles long. The company is capitalized at $30,000 and the incorporators are H. B. McFarland, T. K. Colesfi, of Lennox; and A. B. McFarland, of Centerville.

PROPOSALS.

ELECTRICAL EQUIPMENT.—Sealed proposals will be received at the office of the Bureau of Supplies and Accounts Navy Department, Washington, D. C., until October 28 for furnishing one oil tempering bath, electrically heated; one pyrometer and case; one thermo-couple and protecting tube; all to be delivered at the Navy Yard, Boston, Mass., as per schedule 5,924. The Bureau will also receive bids until November 11 for one portable electric welding apparatus, to be delivered at the Navy Yard, Mare Island, Cal., as per Schedule, 5,940.

ELECTRIC CONDUIT AND WIRING AND INTERIOR LIGHTING FIXTURES.—Sealed proposals will be received at the office of the Supervising Architect, Washington, D. C., until November 29 for the conduit and wiring and interior lighting fixtures of a two-story building for the post office at Pulaski, Tenn.; until December 1 of a two-story building for the post office at Burlington, N. J.; until December 3 of a three-story building for the post office at Augusta, Ga.; until January 15, 1914, of a two-story building for the post office at Hilo, Hawaii. Drawings and specifications may be obtained upon application to the Supervising Architect or the custodians of the various sites.

ELECTRIC CONDUIT AND WIRING AND INTERION LIGHTING FIXTURES.—Sealed proposals will be received at the office of the Supervising Architect, Washington, D. C., until November 18 for the electric conduit and wiring and interior lighting fixtures of a one-story building for the post office at Mandan, N. D.; and of a one-story building for the post office at Edwardsville, Ill.; until November 20 of a one-story building for the post office at Perry, Iowa; until November 22 of a two-story building for the post office at Long Branch, N. J., and until November 28 of a two-story building for the post office at Cambridge, O. Copies of drawings and specifications may be had from the office of the Supervising Architect or from the custodians of the various sites named.

ELECTRIC WORK.—Sealed proposals for electric work for Solaria at the New York State Hospital for Crippled and Deformed Children, West Haverstraw, N. Y., will be received by George Blagden, president of the Board of Managers, New York State Hospital for Crippled and Deformed Children, West Haverstraw, N. Y., until October 29. Proposals shall be accompanied by a certified check in the sum of five per cent of the amount bid, and the contractors to whom the awards are made will be required to furnish surety company bond in the sum of 50 per cent of the amount of contract within 30 days after official notice of award of contract. Drawings and specifications may be consulted and blank forms of proposal obtained at the above institution, and at the office of the State Architect. Complete sets of plans and specifications will be furnished to prospective bidders upon reasonable notice to and in the discretion of the State Architect, Lewis F. Pilcher, Capitol, Albany, N. Y.

NEW PUBLICATIONS.

SILVER VOLTAMETER.—Technical Paper No. 201 of the Bureau of Standards is entitled "The Silver Voltameter—Part III." This deals with quantitative experiments and the preparation and testing of silver nitrate, and concludes the series of publications on this subject.

MINERAL PRODUCTION OF CANADA.—The Canadian Department of Mines has published a general summary of the mineral production of Canada for the calendar year 1912. This has been prepared by John McLeish. It covers both metallic and non-metallic products and gives also a table of exports and imports.

PASADENA LIGHTING REPORT.—The sixth annual report of the Municipal Lighting Works Department of Pasadena, Cal., has been issued. It covers the year ending June 30, 1913. A financial statement is included, which shows a surplus of $23,558 after making provision for operating costs, interest on investment and depreciation. The total amount of energy sold during the year was 3,155,000 kilowatt-hours, the average price received being 4.4 cents per kilowatt-hour.

STONE AND WEBSTER PROPERTIES.—Stone and Webster have published a booklet nicely gotten up in two colors and containing maps of their various properties, which lists in condensed form the chief facts of interest regarding the various utilities operated by the Stone & Webster Management Association. It deals especially with securities of these various utilities and shows the amount of securities outstanding, the time and amount of interest and dividend payments, earnings for the past year and other information.

OHIO MONTHLY.—The Ohio Electric Light Association will begin on December 1 the publication of a monthly, authorized at the last annual convention, which will contain cases pending and decisions of the Public Utilities Commission of Ohio affecting light and power companies, as well as legal decisions in the same field. The reports of the standing committees of the Association, central-station notes and other items of general electrical interest will also be included. It will be sent free to members of the Association and additional copies can be secured for $1.00 per year by members or others. The publication is in the hands of the secretary, D. L. Gaskill, Greenville, O.

COAL ANALYSES.—Designing and operating engineers, industrial concerns, and others interested in the distribution and character of the different coals in the United States will find valuable information in a report just issued by the United States Bureau of Mines as Bulletin 22, entitled "Analyses of Coals in the United States, with descriptions of mine and field samples collected between July 1, 1904, and June 30, 1910." This report contains the analyses of 5,000 samples of coal taken from 1,500 coal mines and prospects situated in the various coal fields of the United States. Not only all of the important fields are represented, but practically all of the more important mining districts. Copies may be obtained from the Bureau of Mines, Washington, D. C.

FINANCIAL NOTES.

For the purpose of increasing its authorized issue of six-per-cent preferred stock from $2,000,000 to $3,000,000 and its authorized common stock from $2,000,000 to $3,000,000 the Public Service Investment Company has called a special meeting of stockholders for October 30. Stock transfer books of the company will be closed from October 20 to October 30.

Advices from Lafayette, La., announce the recording of a mortgage for $5,000,000 to secure an issue of bonds in connection with the construction of an electric railway connecting Berwick and Lafayette. It is executed by the Southwestern Traction & Power Company to the Whitney-Central Trust & Savings Bank of New Orleans, and the Continental & Commercial Trust & Savings Bank of Chicago, Ill., as trustees. This mortgage is made payable twenty-five years from date. It is a first mortgage on all the holdings of the Southwestern Traction & Power Company.

Pending a decision of the Massachusetts Gas & Electric Commission on the petition for new stock, the annual meeting of the Edison Electric Illuminating Company of Boston was adjourned until November 11. President Edgar stated that for the past three months business of the company has grown at the rate of 10 per cent per annum, or at practically at same rate as for the fiscal year ended June 30 last. The proposed new issue of stock, he stated, was necessary to pay off debt, which would approximate $6,000,000 probably by spring.

The following announcement has been made by the Electric Company of America: "Notice is hereby given that arrangements have been made whereby stock deposited between October 24 and November 1, 1913, with Cassatt & Company, Arcade Building, Philadelphia, may be exchanged for its equivalent at $14 a share in either $100 or $1,000 American Gas and Electric Company bonds, fractional amounts being made up in negotiable script. In case $1,000 bonds are required delivery will be made on stock so desposited on or before December 1, 1913. Holders of $100 bonds of the American Gas and Electric Company who wish to exchange them for the equivalent in $1,000 bonds, may do so at their own expense and risk by depositing their $100 bonds with Cassatt & Company between the dates given."

Dividends.

American District Telegraph Company of New Jersey; a quarterly dividend of one per cent, payable October 29.

American Electric Company; 85 cents, payable November 1 to stock of record October 23.

Brazilian Traction, Light & Power Company; a quarterly dividend of 1.5 per cent, payable November 20 to stock of record October 31.

Cape Breton Electric Company of Sidney, N. S.; the regular semi-annual dividend of $3 a share on the preferred stock and $3 a share on the common stock, payable November 1 to stock of record of October 21.

Cities Service Company; regular monthly of 0.5 per cent on preferred and five-twelfths of one per cent on common, both payable November 1 to stock of record October 15.

Commonwealth Power, Railway & Light Company; quarterly of 1.5 per cent on preferred and one per cent on common, payable November 1 to stock of record October 17.

Connecticut Railway & Light Company; quarterly of one per cent, payable November 15.

East St. Louis & Suburban Railway Company; quarterly of 1.25 per cent on preferred, payable November 1 to stock of record October 15.

Electric Company of America; an extra distribution of 35 cents per share, payable November 1.

Grand Rapids Railway Company; quarterly of 1.25 per cent on preferred, payable November 1 to stock of record October 15.

Guanajuato Power & Electric Company; one and one-half per cent on the preferred stock, payable November 1 to stock of record on that date.

Keystone Telephone Company; initial of three per cent on preferred, payable November 15 to stock of record October 24.

Lehigh Valley Transit Company; regular semi-annual of one per cent on the preferred stock, payable November 10 to stock of record October 31.

Lewiston, Augusta & Waterville Street Railway; a quarterly preferred dividend of 1.5 per cent, payable November 1.

Mexican Telegraph & Telephone Company, semi-annual of 2.5 per cent on preferred, payable November 1 to stock of record October 18.

Mexican Tramways Company; quarterly of 1.75 per cent, payable November 1 to stock of record October 22.

Monongahela Valley Traction Company; a dividend of 1.5 per cent, payable November 1 to stock of record October 27.

Pacific Gas & Electric Company; quarterly of 1.5 per cent on preferred, payable November 15 to stock of record October 31.

Pacific Power & Light Company; quarterly of 1.75 per cent on the preferred stock, payable November 1 to stock of record October 23.

Public Service Company of Northern Illinois; quarterly of 1.75 per cent on common and 1.5 per cent on preferred, payable November 1 to stock of record October 18.

Railways Company General; regular quarterly of one per cent, payable November 1.

Utilities Improvement Company; regular monthly of 0.5 per cent on preferred and one-sixth of one per cent on common, both payable November 1 to stock of record October 15.

West Penn Railways Company; quarterly of 1.25 per cent on preferred, payable November 1 to stock of record October 24.

Reports of Earnings.

REPUBLIC RAILWAY & LIGHT.

	1913	1912
August gross	$ 261,521	$ 227,513
Net after taxes	204,871	90,009
Surplus after charges	61,097	46,098
12 months gross	2,909,291	2,555,289
Net after taxes	1,146,643	1,019,129
Surplus after charges	609,224	487,075

SPRINGFIELD STREET RAILWAY.

The Springfield (Mass.) Street Railway reports for the year ended June 30, 1913, compared as follows:

	1913	1912
Gross	$2,089,515	$1,890,406
Total net	598,819	577,474
Surplus	12,759	5,609

SOUTHERN UTILITIES.

The Southern Utilities Co. reports earnings for August and five months ended August 31, are as follows:

	August	5 months
Gross earnings	$88,610	$390,988
Net after taxes	26,753	119,784
Surplus after charges	20,824	94,025
Balance after preferred dividends	12,219	51,004

PACIFIC LIGHT CORPORATION.

The report of the Pacific Light & Power Corporation for the year ended August 31, 1913, shows net earnings of $775,191, an increase of $213,845. The income account compares as follows:

August—	1913	Increase
Gross earnings	$259,342	$ 46,478
Expenses and taxes	141,624	16,777
Balance	$117,718	$ 29,701
Interest charges	40,689	*2,312
Net profit	$ 77,029	$ 32,013
From Sept. 1 to Aug 31—		
Gross earnings	2,772,732	354,776
Expenses and taxes	1,527,980	170,829
Balance	$1,244,752	$183,947
Interest charges	469,561	*29,898
Net profit	$ 775,191	$213,845

*Decrease.

WESTERN UNION COMPANY.

The report of the Western Union Telegraph Company for the year ended June 30, 1913, shows net earnings of $3,426,059, against $5,597,603 the year previous. The balance unavailable for dividends was $3,126,280, equal to 3.13 per cent on the capital stock, as compared with 5.26 per cent earned the previous year. The income account compares as follows:

	1913	1912
Gross telegraph earnings	$45,321,451	$40,857,769
Miscellan. earnings	1,064,542	803,761
Total earnings	$46,385,993	$41,661,439
*Expenses and taxes	42,959,934	36,063,836
Net earnings	$3,426,059	$ 5,597,603
Other income	1,037,450	1,326,368
Total income	$ 4,463,509	$ 6,923,971
†Appropriations	.....	1,250,000
Interest	1,337,229	1,670,417
Surplus	$ 8,126,280	$ 4,003,555
Dividends	2,992,166	2,991,824
Surplus	$ 134,114	$ 1,011,781

*Includes rent of leased lines, reconstruction, repairs, etc. †Appropriations for reserves for repairs and reconstruction of land lines in addition to the six months' appropriation included in operating expenses.

CLOSING BID PRICES FOR ELECTRICAL SECURITIES OF THE LEADING EXCHANGES AS COMPARED WITH THE PREVIOUS WEEK.

	Oct. 20.	Oct. 13.
American Tel. & Tel. (New York)	121	120⅞
Commonwealth Edison (Chicago)	152	152
Edison Electric Illuminating (Boston)	262	267
Electric Storage Battery common (Philadelphia)	46	47½
Electric Storage Battery preferred (Philadelphia)	46	47½
General Electric (New York)	140¼	140¼
Kings County Electric (New York)	119	119
Manhattan Transit (New York)	1¼	1¼
Massachusetts Electric common (Boston)	12	15
Massachusetts Electric preferred (Boston)	67	67½
National Carbon common (Chicago)	116	116
National Carbon preferred (Chicago)	115	115
New England Telephone (Boston)	139	148
Philadelphia Electric (Philadelphia)	22⅝	23
Postal Telegraph and Cables common (New York)	77½	80
Postal Telegraph and Cables preferred (New York)	65	66
Western Union (New York)	60½	63
Westinghouse common (New York)	64⅜	68
Westinghouse preferred (New York)	110	110

*Last price quoted.

PERSONAL MENTION.

MR. CHARLES R. HOSMER has been elected president of the West Kootenay Light & Power Company, succeeding the late Mr. M. M. DOULL.

MR. E. H. SUTTON has joined the sales department of the American Conduit Manufacturing Company. Mr. Sutton's work will be that of special representative, with headquarters at Pittsburgh.

MR. E. B. BURRITT, who has become secretary of the American Electric Railway Association, was presented with a traveling bag by the officials of the Washington Railway & Electric Company upon severing his connection with them.

MR. GERARD SWOPE, vice-president of the Western Electric Company, delivered an address entitled "The Western Electric Company's Place in the Bell System," on Tuesday, October 21, at the 126th meeting of the Telephone Society of New York.

MR. EDWARD R. TAYLOR, of Penn Yan, N. Y., has been appointed by President Roeber to represent the American Electrochemical Society at the National Conservation Congress which will be held at Washington, D. C., next month. Mr. Taylor is a vice-president of the American Electrochemical Society.

MR. W. J. ARTHUR REED, Detroit representative of the Bryan-Marsh Electric Works, with Mrs. Reed, started on Friday, October 17, for Chicago for a trip around the world. They will be gone five months and will visit Vancouver, San Francisco, Honolulu, Japan, China, the Mediterranean and Continental Europe.

THE RIGHT HONORABLE HERBERT SAMUEL, M. P., Postmaster General of Great Britain, who is the executive head of the government-owned telephone and telegraph system in England, has been investigating telephone and telegraph systems in the United States and Canada. He will return to England after his investigations at Washington have been completed.

MR. HOMER E. NEISZ, general manager of the Cosmoplitan Electric Company, Chicago, has been appointed Statesman for Illinois of the Jovian Order. Chicago Jovians and the order in general are to be congratulated upon the appointment of Mr. Neisz, who has always been an ardent worker in the ranks, a member of past Congresses and a man of great influence in his community.

MR. ALBA H. WARREN, for the last five years manager of the Pensacola (Fla.) Electric Company, will go, on November 1, to Galveston to assume charge of the Galveston Electric Company, one of the properties of the Stone & Webster Corporation. He will be succeeded by MR. THOMAS J. HANLON, for the last five years superintendent of transportation and assistant manager at Pensacola.

MR. ANDREW N. FOX, manager of the publicity department of the Benjamin Electric Manufacturing Company, Chicago, has been reappointed instructor of the 20-week course in advertising which will be given by the Young Men's Christian Association of Chicago. Mr. Fox brings to his work the experience of an active advertising man, who is familiar with class-room methods. He has a great faculty for imparting information and his method of handling the situation inspires confidence along with instruction. Mr. Fox is a director of the Chicago Advertising Association, vice-president of the Central Division of the Associated Advertising Clubs of America, and a member of that organization's board of lecturers.

OBITUARY.

MR. RALPH D. GILLETT, president of the Hampden Railroad Corporation, and head of the Woronoco Construction Company, died October 14 at Westfield, Mass., of heart failure. He was 47 years of age and had long been active in railway and railroad construction work in western Massachusetts. He was instrumental in introducing street railways in and around Westfield, built lines for the Berkshire and the Western Massachusetts Street Railway Companies, and was an officer in the Western Massachusetts Construction Company which is building an electric railway line in Huntington and Lee, Mass. He was president of the Buffalo, Rochester & Eastern Railroad which had projected a line across New York State. He leaves a wife and six children.

MR. FRANCIS VALENTINE TOLDERVY LEE, died at Victoria, B. C., August 17, 1913. Mr. Lee was a graduate of Leland Stanford, Jr., University, 1897, and served as assistant to Dr. F. A. C. Perrine, professor of electrical engineering; he was vice-president and general manager of John Martin & Company, electrical engineers and contractors; engineer and afterwards district Pacific Coast manager for the Stanley Electric Manufacturing Company. At the time of his death he was a member of the American Society of Mechanical Engineers, the Institution of Electrical Engineers, the American Institute of Electrical Engineers, the American Gas Institute, the American Society of Civil Engineers, and the American Electrochemical Society. Of the latter he was a charter member. Mr. Lee was born in England, August 28, 1870.

DR. RUDOLPH DIESEL, well known engineer and inventor, disappeared from the Great Eastern Railway Company's steamer *Dresden* on her passage from Antwerp to Harwich, on the night of Monday to Tuesday, September 29 to 30. There seems to be no doubt as to the fate of Dr. Diesel, owing to the discovery of the body of a man floating at the entrance of the River Scheldt. The fisherman who discovered the body was unable to bring it in owing to the rough sea. He removed money and jewelry which was identified by Dr. Diesel's son as belonging to his father. Rudolph Diesel was born of German parents in Paris in March, 1858. He completed his technical studies in the Augsburg technical schools and the Munich Technical College, from which he graduated in 1879. In 1893 he published his ideas respecting the improvement of efficiency of prime movers in his book entitled "Theorie und Konstruktion eines Rationellen Warmemotors." These conclusions attracted attention throughout the entire world and Dr. Diesel was afforded financial aid by Messrs. Krupp and the Augsburg-Nuremberg Company for the construction of an engine of the type he advocated. The first Diesel engine, a vertical, four-stroke cycle type, was built in 1893. Quite recently Diesel engines have been built in considerable numbers. Dr. Diesel was on his way to visit the Ipswich works of the Consolidated Diesel Engine Manufacturers, Limited, accompanied by Georges Carels, of Carels Freres, Ghent, and Mr. Luckmann, chief engineer of that company. When the boat arrived at Harwich, Dr. Diesel was missing. It was presumed that he returned to the deck previous to retiring for the night, and by some accident fell overboard and was drowned.

FOREIGN TRADE OPPORTUNITIES.

(Where addresses are omitted they may be obtained from the Bureau of Foreign and Domestic Commerce, Washington, D. C. In applying for addresses refer to file number.)

No. 11,781. AERIAL ELECTRIC CABLEWAY.—A foreign Government is assisting in the establishment of a lengthy aerial cableway to be operated by hydroelectric power. A company has been organized to erect the line, and the Government engineer who is associated with the enterprise hoped that the entire electric equipment would be purchased from United States manufacturers.

No. 11,810. AUTOMOBILES, MOTOR BOATS, AND ELECTRICAL SUPPLIES.—An American consular officer in a Latin-American country reports that a resident of his district has just opened a new store for the handling of automobiles, motor boats, and electrical supplies. He states that he also proposes to carry a full line of tools for carpenters, machinists, etc.

No. 11,816. ELECTRICAL APPLIANCES.—A report from an American consul states that a firm of electrical engineers and contractors in India would like to secure an agency for a good line of American electrical heating and cooking appliances, etc. Correspondence may be in English. This firm is said to be doing a large business in the sale of electrical heating appliances.

NO. 11,821. ELECTRICAL EQUIPMENT.—The Agent General for Victoria, Melbourne Place, Strand, London, W. C., England, will receive tenders until November 15 for overhead electrical equipment of permanent-way and overhead-transmission mains in connection with the electrification of the Melbourne Suburban Railways now being carried out.

DATES AHEAD.

Electric Vehicle Association of America. Annual convention, Hotel La Salle Chicago, Ill., October 27-28.

National Academy of Sciences. Autumn meeting, Johns Hopkins University, Baltimore, Md., November 18-19.

Ohio Society of Mechanical, Electrical and Steam Engineers. Annual meeting, Columbus, O., November 20-22.

American Automobile Association. Richmond, Va., December 1-3.

American Society of Mechanical Engineers. Annual meeting, New York, N. Y., December 2-5.

American Institute of Chemical Engineers, New York, N. Y., December 10-13.

American Association for the Advancement of Science. Annual meeting, Atlanta, Ga., December 29-January 3, 1914.

With the Electrical Manufacturers

H. W. Johns-Manville Company, New York City, announces that its electrical department has recently completed the installation of lighting fixtures to the value of $19,590 in the new station at Rochester, N. Y., of the New York Central & Hudson River Railroad.

Kermel Apparatus Company, 145 Main Street, Cambridge, Mass., has issued a folder describing its new Kermel alternating-current and direct-current voltmeters, ammeters, volt-ammeters and hot-wire meters. This folder shows illustrations of each of these instruments, gives data concerning them and points out their distinctive features and advantages.

E. B. Badger & Sons Company, 75 Pitts Street, Boston, Mass., has issued a catalog describing corrugated copper expansion joints. Included in this are two tables which contain data on the length of pipe cared for by a standard joint and which should prove of considerable value to consulting and designing engineers and also to operating engineers who may have occasion to make changes in steam lines.

Schweitzer & Conrad, 1770 Wilson Avenue, Chicago, have issued bulletin No. 1, dealing with the S. & C. extra-high-potential fuses. These fuses are made for voltages up to 66,000 and are of the tubular chemical type, making them very compact in installation and reliable in operation. The bulletin gives a detailed description of their construction and adaptability and points out many advantages that accrue from their use. Many illustrations of typical installations, the fuses themselves and oscillograms are shown. Full data on the various types are included.

General Fire Extinguisher Company, Providence, R. I., in the October quarterly issue of its house organ, the "Grinnell Automatic Sprinkler Bulletin," calls attention to some very important lessons from the disastrous fire in a clothing factory at Binghamton, N. Y., last summer. This article is strikingly illustrated. Another important article points out that the chief fire danger in theaters lies behind the proscenium arch. This article is illustrated with several fine views of theaters, which are protected by Grinnell automatic sprinklers. There are also included, as usual, the reports of fires occurring within the last quarter in buildings protected by these sprinklers. The average loss per fire in sprinkled buildings is given as $266.24, compared with $7,361, which was the average loss paid by a group of mutual insurance companies prior to the introduction of sprinkler protection.

Record of Electrical Patents.

Issued by the United States Patent Office, October 14, 1913.

1,075,331. Pantograph Trolley. F. E. Case, assignor to General Electric Co. Pneumatically operated.

1,075,349. Trolley. J. Gay, Jordanville, N. Y. Has tension springs on each end of the tilting base.

1,075,362 to 1,075,364. Electrolytic Cell. C. W. Marsh, assignor to Hooker Electrochemical Co., New York, N. Y. The first patent provides for a number of vertically superposed cell units having a common body. The second and third patents relate to circular cells with cathode compartments and diaphragms bent to provide recesses extending radially outward.

1,075,365. Electric-Lamp Attachment. W. P. McNeel, San Antonio, Tex. A lamp-dimming rheostat with plug at one end and socket at the other.

1,075,370. Lighting Fixture. O. H. Mohr, Kentfield, Cal., assignor to Mohrlite Co. For a modified form of cove lighting with curved reflecting shell, ribs dividing it into cavities and a lamp behind the lower ledge of each cavity.

1,075,371. Automatic Parcel-Carrier. W. L. Nelson, Boss, Mo. Includes a motor-propelled carriage.

1,075,386. Device for Electrocuting Animals. H. Smith, Dedham, Mass. The floor in the cage is connected to one side of a high-tension circuit and a suspended leash and collar are connected to the other side of the circuit, which is closed on closing the door of the cage.

1,075,402. Vapor Electric Device. F. P. Coffin, assignor to General Electric Co. Mercury-arc rectifier with metal main chamber and metal cathode chamber.

1,075,404. Impedance Device for Use with Current-Rectifiers. F. Conrad and Y. Sakai, assignors to Westinghouse Electric & Mfg. Co. Includes an inductive device with two windings respectively traversed by alternate half waves of the current to be rectified, and another winding traversed by both half waves.

1,075,421. Electric Signaling System. R. M. Hopkins, New York, N. Y., assignor to American District Telegraph Co. Includes a normally closed signaling circuit and a current changer to vary the current in that circuit and thereby operate the signal instrument.

1,075,423. Telephone Hand Set. R. R. Ireland and A. F. F. Gilson, assignors to Western Electric Co. A transmitter and receiver are mounted on opposite ends of a handle.

1,075,427. Recording Meter. P. Lanham, Lanham, Md. A conductive column of liquid in a circuit controls the recorder.

1,075,430. Telephone-Exchange System. F. R. McBerty, assignor to Western Electric Co. Includes a selector, a test circuit therefor and means for making a double test.

1,075,436. Electric Heater. W. O. Peale, assignor to Westinghouse Electric & Mfg. Co. Conprises a number of heater units, one above another, and a heat reflector for each unit.

1,075,441. Electromagnetic Retaining Device. G. Rekers, assignor to General Railway Signal Co., Gates, N. Y. For a semaphore signal

1,075,448. Annunciating Means for Cash Registers. G. F. W. Schultze, Oakland, Cal. The keys are electrically connected to the annunciating means.

1,075,445. Controller for Electric Motors. H. A. Steen, assignor to Westinghouse Electric & Mfg. Co. The control gear is driven by a motor.

1,075,452. Dynamo-Electric Machine. H. Weichsel and S. T. Webster, assignors to Wagner Electric Mfg. Co., St. Louis, Mo. The machine has two armature windings and can be connected to a storage battery as a motor or used as a generator to charge the battery.

1,075,457. Electrical Distributor. J. L. Adams, Jr., assignor to Westinghouse Electric & Mfg. Co. Includes an inclined rotary brush engaging circumferential contacts.

1,075,462. System of Train Control. J. L. Crouse, assignor to Westinghouse Electric & Mfg. Co. Multiple-unit control of two locomotives governed by application of the air brakes of either unit.

1,075,463. Lamp Socket. J. Darby, Summit, N. J. Covers details of a pull-chain switch.

1,075,470. Railway-Motor Ventilation. J. D. Forber, assignor to Westinghouse Electric & Mfg. Co. The gear case has an air chamber communicating with the interior of the motor and means for introducing air from the ventilating system to the air chamber.

1,075,472. Electrically Heated Stove Unit. W. S. Hadaway, Jr., assignor to Westinghouse Electric & Mfg. Co. The heating unit has two sets of contacts, either of which may be connected by movable arms to the stationary contacts on the base.

1,075,473. Electric Soldering Iron. W. S. Hadaway, Jr., assignor to Westinghouse Electric & Mfg. Co. Wedged in the head is a thin tubular heating unit.

1,075,475. Incandescent Lamp. R. H. Henderson, assignor to Westinghouse Lamp Co. The filament is applied to a support having a hook to receive it and a guard for the hook which is later removed.

1,075,479. Galvanic Cell. M. L. Kaplan, Brooklyn, N. Y. Contains as a depolarizing agent sesquihydrated manganese peroxide.

1,075,484. Arc-Lamp Electrode. G. M. Little, assignor to Westinghouse Electric & Mfg. Co. Contains iron oxide and potassium silicate.

1,075,485. Telephone Pay Station. G. A. Long, assignor to Gray Telephone Pay Station Co., Hartford, Conn. Relates to the associated signaling means.

1,075,497. Electric Soldering Iron. E. E. Rose, assignor to Westinghouse Electric & Mfg. Co. Relates to the method of mounting the heater in the soldering tip.

1,075,502. Commutator for Dynamo-Electric Machines. T. S. Scott, assignor to Westinghouse Electric & Mfg. Co. Has composite clamping rings made of convolutions of wire and an insulating metal armor therefor.

1,075,503 and 1,075,504. Telegraph Transmitter. C. E. Scribner, assignor to Western Electric Co. The first patent provides means for automatically operating selected switches of a series in predetermined succession. The second patent relates to a means for selectively operating current-control relays in pairs.

1,075,513. Electric Recording Instrument. A. L. Sohm, assignor to Sohm Electric Signal & Recording Co., Spokane, Wash. Includes a printing mechanism adapted to print the time and other designations across a paper web.

1,075,515. Wood Grinding and Polishing Machine. J. Steingässer and E. Gottesleben, Mayence, Germany. Includes an electric motor suspended by means of a universal link.

1,075,517. Electrical Heater Element and Method of Making the Same. H. B. Taylor, assignor to Westinghouse Electric & Mfg. Co. Comprises a heat-conducting sheath having a continuous outer surface and an insulated high-resistance conductor maintained at the minimum thickness within the sheath.

1,075,524. Mixing Apparatus. W. S. Veaco, Berkeley, and T. J. Bennett, San Francisco, Cal. A vertical shaft with an agitator at the bottom fits within the tubular armature shaft of the motor.

1,075,531. Magneto Ignition Device. H H. Wixon, assignor to Stromberg Motor Devices Co., Chicago, Ill. Covers details of a magneto generator.

1,075,532. Arc Lamp. J. J. Wood, assignor to General Electric Co. Relates to latching means for an inclosing globe.

1,075,539. Casing for Incandescent-Electric-Lamp Sockets. C. H. Bissell, assignor to Crouse-Hinds Co., Syracuse, N. Y. The cap has an annular notched groove for fastening to the shell.

1,075,541. Bracket. A. W. Browne, assignor to S. S. White Dental Mfg. Co., Philadelphia, Pa. For adjustably mounting an electric motor for dentists' use.

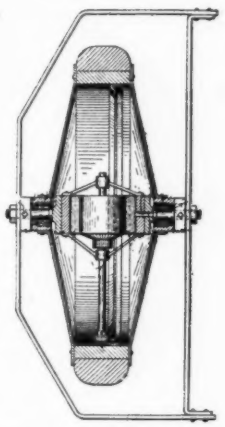
1,075,542. Train Annunciator. S. C. Bryant, assignor to Bryant Zinc Co., Chicago, Ill. An electromagnetically operated combination visual and audible signal.

1,075,543 and 1,075,544. Time Recorder. J. W. Bryce, Brooklyn, N. Y. The master clock electrically synchronizes a set of elapsed-time recorders.

1,075,556. Battery. W. H. Fenoughty, assignor to American Carbon & Battery Co., East St. Louis, Ill. A container for two dry cells includes connections for the cells.

1,075,563. Metal Filaments. C. A. Hansen, assignor to General Electric Co. A squirted filament made from a mixture of oxide of tungsten, starch, glycerine and glucose.

1,075,565. Combined Illuminating and Advertising Device. G. A. Harter, Chicago, and J. C. Smith, Oak Park, Ill.; said Harter assignor to R. H. Rice. Surrounding the lamp is a special reflector with flat front, on which advertisements appear.



1,075,717.—Motor-Inclosed Vehicle Wheel.

1,075,570. Electrolytic Cell. A. H. Hooker, assignor to Hooker Electrochemical Co., New York, N. Y. A high-amperage cell for the electrolysis of alkaline chloride solutions has vertical anodes and cathodes and an interposed diaphragm.

1,075,573. Transformer Bushing and Terminal Board. S. E. Johannesen, assignor to General Electric Co. The terminal board is an extension of the inside of the bushing.

1,075,579. Motor Starter. C. D. Knight, assignor to General Electric Co. A polyphase starter with primary-circuit switch is arranged to automatically decrease the impedence of the secondary and to reintroduce this impedence on failure of the voltage.

1,075,595. Electrically Driven Railless Trains. W. A. T. Müller, Berlin-Steglitz, Germany. The motor armatures are connected to one set of mains and the motor fields to another. The mains are connectable in series.

1,075,600. Derailment Guard. W. L. Nelson, Boss, Mo. For a motor-driven automatic parcel carrier.

1,075,608. Recording System and Apparatus. A. L. Sohm, assignor to Sohm Electric Signal & Recording Co., Chicago, Ill. Includes a number of printing electromagnets.

1,075,609. Electrolytic Cell. G. W. Stone, assignor to Hooker Electrochemical Co., New York, N. Y. A concrete cell with separable cathode chambers.

1,075,612. Means for Fastening Electric-Lamp Sockets. W. C. Tregoning, assignor to Tregoning Electric Mfg. Co., Cleveland, O. For mounting the socket flush in a supporting plate.

1,075,613. Socket and Terminal Connection for Electric Lamps. W. C. Tregoning, assignor to Tregoning Electric Mfg. Co. For securing the shell and terminal together.

1,075,614. Image-Transmitting Telegraph. L. Tschörner, Vienna, Austria-Hungary. The receiver has a surface over which the reproducer moves.

1,075,615. Vapor Electric Device. E. Weintraub, assignor to General Electric Co. Has an inner and an outer mercury-arc tube.

1,075,634. Process for the Production of Refractory, Electrically Conducting Molded Bodies. G. Egly, assignor to Gebrueder Siemens & Co., Berlin, Germany. Consists in molding a mixture of silicon and carbon with a binder and heating it in two stages to produce silicon carbide.

1,075,660. Electrolytic Cell. C. W. Marsh, assignor to Hooker Electrochemical Co. Has a number of superposed chambers for electrolyte, each provided with opposite lateral openings for the electrodes.

1,075,661. Lead Alloy. C. P. McConnell, assignor to Western Electric Co. A thin tape for winding electric conductors is composed of an alloy of 95 per cent lead, 4.5 per cent antimony and 0.5 per cent tin.

1,075,669 Electric Rat-Trap. J. Regeczi, Gary, Ind. Has electric contact plates in each compartment of the trap.

1,075,675. Automatic Water Cutoff. S. O. Thompson, Maxton, N. C., assignor of four-tenths of R. M. Williams. Thermostatic and electromagnetic control of two valves.

1,075,680. Photographic - Printing Machine. J. N. Anderson, Chicago, Ill. Includes an electric lamp.

1,075,683. Electric Motor Drive. C. C. Batchelder, assignor to General Electric Co. A number of direct-current motors are arranged to drive frequency changers in different directions and at slightly different speeds.

1,075,704. Electromagnetic Control of Pneumatic Door Motors. T. Farmer, Jr., assignor to Consolidated Car Heating Co., Albany, N. Y. The valves are electromagnetically operated.

1,075,713. Electrode. J. L. R. Hayden, assignor to General Electric Co. Composed of an earth-metal titano-fluoride, an alkaline titano-fluoride and carbon.

1,075,717. Wheel Structure. R. Macrae, Chicago, Ill. Secured to the hollow axle and within the wheel is an electric motor whose armature shaft is bevel-geared to the rim of the wheel. (See cut.)

1,075,733. Pressure-Operating Device. A. Simon, assignor to Cutler-Hammer Mfg. Co., Milwaukee, Wis. A pressure valve governs a motor controller through a solenoid.

1,075,738. Repairing Railway Rails. E. Thomson, Swampscott, Mass. Provides transformer-secondary electrodes for heating and engaging both sides of a rail. one electrode constituting

an anvil for maintaining the inner line of the rail head undisturbed and the other electrode constituting a pressure tool. (See cut.)

1,075,749. Circuit - Breaker. C. C. Badeau, Bethlehem, Pa., assignor to Roller-Smith Co. The hinged arm has flexible contact strips bent to form the release magnet.

1,075,763. Ignition and Starting Mechanism for Internal-Combustion Engines. L. E. Clark, Meadville, Pa. The generator is driven by a starting motor and then a centrifugal governor connects it through a friction clutch to the engine.

1,075,767. Electric Sign. F. R. Crane, Jr., Chicago, Ill., assignor to Crane Electric Specialty Co. Each letter structure contains a lamp that can be inserted through the base of the framework.

1,075,768. Arc-Lamp Electrode. F. R. Crane, Jr., Chicago, Ill., assignor of one-third to H. Jampolis and one-third to G. N. Nelson. Consists of 75 per cent comminuted carbon, 12.5 per cent soda ash, 5 per cent cast-iron filings, 5 per cent metallic magnesium, and 2.5 per cent clay, as a binder.

1,075,773. Composition for Heat-Insulating and Thermoelectric Purposes. P. Ferra, Lyon, France. Is composed of 78 per cent copper sulphide, 20 per cent sulphur and 2 per cent kaolin.

1,075,786. Apparatus for Producing and Utilizing Micro Movements in Weak-Current Technics. J. A. Johnsen, Copenhagen, Denmark. The coil carrying the weak current and a microphone are freely suspended in a strong magnetic field.

1,075,787. Construction of Trolley Insulated Sections. R. R. Miller, Pueblo, Colo., assignor to Miller Electric Switch Co. Covers details.

1,075,799. Controlling Cam. C. M. Walker, Pueblo, Colo., assignor to Miller Electric Switch Co. For an electromechanical switch.

1,075,827. Portable Electric Light. C. Hubert, New York, N. Y. A circuit-closer for a pocket flashlight.

1,075,847. Spark-Controller for Explosive Engines. A. L. Moeller, Mishicott, Wis. Includes a stationary electrode and a rocking electrode.

1,075,873. Apparatus for Bleaching and for Preparing Bleaching, Deodorizing and Disinfecting Solutions. O. Sumner, assignor to International Bleachers' Corporation, Ltd., London, Eng. Comprises a tapered chamber within a tank, an opening from the tank to the chamber, an electrode in the tank and also one in the chamber.

1,075,882. Indicator and Power Device Therefor. W. E. Walters and M. E. Walters, Los Angeles, Cal. Electromagnet poles are arranged for producing a moving magnetic field and thereby rotating the wheel.

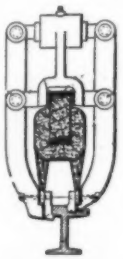
1,075,894. Target Apparatus for Use with Kinematographs. B. W. Bates, H. W. Kelly and D. H. Corbin, assignor to Life Targets, Ltd., London, England. Electromagnetic means actuated by sound waves are arranged for arresting the picture-projecting device.

1,075,897. Electrode. R. N. Chamberlain and S. J. Hall, assignors to Gould Storage Battery Co., Depew, N. Y. The plates are hollow and formed from a pair of complimentary perforated plates placed parallel and closely together, so as to provide a vertical interior circulation passage for electrolyte.

1,075,920. Projecting Apparatus. H. Krieger and C. F. Dewey, New York, N. Y.; said Dewey assignor to said Krieger. Has an adjustable arc lamp.

1,075,924. Incandescent Lamp and Reflector. W. R. Litzenberg, Portland, Ore. The lamp tip is provided with a threaded portion on which is screwed a reflector for indirect lighting.

1,075,949. Signaling Device for Estimating Distances. J. U. Smith, Berkeley, Cal. Includes a sounding member, an oscillator, and mechanism located at a distant station and sensitive to electromagnetic waves radiated from the oscillator and also sensitive



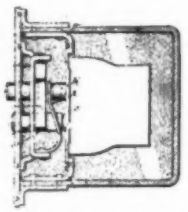
1,075,738.—Electric Rail Repairs.

to sound waves emitted by the sounding member.

1,075,953. Electric-Lamp Switch. J. A. M. Traus, Rotterdam, Netherlands. A liquid contact-maker is arranged to be operated by an electromagnetically actuated cam.

1,075,955. Door-Lock Switch. G. Wright and H. P. Ball, assignors to General Electric Co. A two-button switch has an auxiliary push button in line with one of the main buttons, a detent for locking the auxiliary button when the switch is closed, a trip for releasing the detent and independent tripping means actuated by the door bolt. (See cut.)

1,075,958. Process of Making Accumulator-Plates. B. Zyttkowski, Berlin, Germany. Consists in punching and thereby forming cylindrical tubes perpendicularly erected on the plate.



1,075,955.—Door-Lock Switch.

1,075,973. Portable Electric-Lighting Apparatus. H. H. Hirsch, Philadelphia, Pa. An electric safety lamp for mounting on a miner's cap has a device to open the circuit when a glass panel is broken.

1,075,974. Double Ignition System for Internal-Combustion Engines. D. B. Hughes, assignor to Citizens Savings & Trust Co., Cleveland, O. A combined battery and generator system.

1,075,986. Electric Switch. J. F. McElroy, assignor to Consolidated Car-Heating Co. An inclosed push switch.

1,075,987. Automatic Contacting Device. F. McMahon, Union City, Ind., assignor of one half to F. W. Schmidt. Adjoining commutator and collector-ring brushes are arranged to be connected together when a certain speed is attained.

1,075,995. Apparatus for Electrocuting Animals. H. Smith, Dedham, Mass. Has spaced conducting plates in the bottom of the receptacle and means whereby the closing of the lid closes the circuit.

1,076,004. Flat-Bed Rotary Printing Press. H. B. Cooley, assignor to American Paper Goods Co., Kensington, Conn. Electrically operated mechanism for moving the impression cylinder toward and away from the form cylinder.

Patents That Have Expired.

Following is a list of electrical patents (issued by the United States Patent Office) that expired October 20, 1913:

569,598. Electric apparatus for registering figures at distances. M. Arndt, Aix-la-Chapelle, Germany.

569,618. Electric conduit and appurtenances. M. Dickerson, Fort Wayne, Ind.

569,634. System of distributing electrical power, etc. W. D. Gharky, Philadelphia, Pa.

569,649. Electric band. John E. Luck, Minneapolis, Minn.

569,692. Multiple-fuse cutout. G. T. Voorhees, Boston, Mass.

569,727. Locking electric-lamp socket. W. L. Taylor, East Liverpool, O.

569,738. Underrunning trolley. N. C. Bassett, Lynn, Mass.

569,746. Electric motor. H. B. Collins, Fulton, N. Y.

569,754. Electric lighting by wind power. J. W. Gibboney, Lynn, Mass.

569,764. Illuminated sign. C. L. Nason, New York, N. Y.

569,772. Trolley support for electric railways. S. H. Short, Cleveland, O.

569,785. Electric gas-lighting burner. W. E. Cram, Boston, Mass.

569,802. Electric machine. A. Schmid, Pittsburgh, Pa.

569,803. Fuse for electric circuits. C. F. Scott, Pittsburgh, Pa.

569,807. Telephony. J. T. Williams, Brooklyn, N. Y.

569,817 and 569,818. Electric arc lamp. Harry P. Davis, Pittsburgh, Pa.

569,824. Brush-holder for dynamos. W. M. Hand, St. Louis, Mo.

569,827. Single-wire electric railway. J. C. Henry, Westfield, N. J.

569,836. Electrically welded pipe joint. A. H. Matatall and I. C. Matatall, Harrison, N. J.

569,851. Thermostatic fire alarm. H. Baer, New York, N. Y.

569,861. Circuit-closer for burglar alarms. C. H. Dowden, Newark, N. J.

569,866. Electric motor. W. E. Freeman, Long Island City, N. Y.

569,881. Electric arc lamp. J. E. Morris, Chester, Pa.

569,882. Lock with electric safety attachment. A. J. Moulart, Paris, France.

569,889. Trolley for electric railways. H. A. Seymour, Washington, D. C.

569,908. Telephone transmitter. H. C. Alexander, Bonham, Tex.

569,911. Electrical muffle or heater. L. E. Custer, Dayton, O.

569,931. Socket and switch for incandescent lamps. J. M. Moffat, London, England.

569,933 and 569,934. Combined electric hydraulic elevator. J. Parkinson, Los Angeles, Cal.